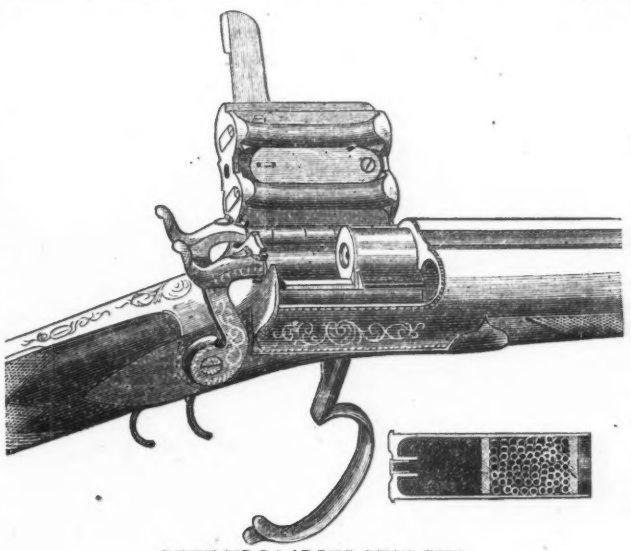
THE ENGINEERING AND MINING JOURNAL.

HENRY W. TROY - DEL. COLLINS & SHUGG, SC.

VOL. X.—NO. 24.—THIRD SERIES.] NEW YORK, TUESDAY, DECEMBER 13, 1870. [SINGLE COPIES 10 CENTS.

Breech-Loading Fire Arms.

AMONG the leading and most successful manufactures of Worcester, Mass., is the concern of ETHAN ALLEN & Co., originally organized some thirty-seven years ago. Mr. ETHAN ALLEN has now arrived at a ripe old age, and no longer attends to business, so the entire control of these extensive works is now in the hands of the junior members of the firm, Mr. S. FOREHAND and HENRY C. WADSWORTH. The specialties of this concern consist of a new model cartridge revolver, new model breech-loading rifle, and their famous breech-loading double-barrel shot gun. Their "seven shooters," as they are familiarly called, are well known, particularly to those who have often found that "a friend in need was one indeed." These revolvers are manufactured of sizes weighing from six to thirteen ounces, and mounted in various ways, with pearl, ivory, and rosewood. The plated parts are handsomely engraved and the whole *ensemble* is perfect. The machinery used in the various departments of their works was mostly invented by Mr. ETHAN ALLEN, and comprises the best of its kind in the country. Each particular part of the revolver and rifle, from the heavy stock to the minutest little screw, has its own particular machine, which turns it out more perfect than human hands could possibly make it. Their breech-loading rifle was one of the first invented in this country, the same care that is manifested in the manufacture of the revolver, is here also to be observed. The rifle in passing through its various stages of manufacture, is subjected to the best quality of workmanship, and certainly when completed is a very perfect article. Often times on the prairies and in the mining regions of the far West have they been the means of protecting many a closely tracked traveller from the scalping knife of the Indian. In less time than it takes to write this description, shot after shot can be rattled out of this piece until one man actually becomes the representative of a dozen in the defence of his own life or perhaps that of his wife and little ones.



BREECH-LOADING SHOT GUN

The breech-loading shot gun made by this concern is also worthy of mention. It has become very popular of late among "sporting men." It is very simple in all its parts, is readily handled, charged and discharged, and is like a faithful friend—always ready. The value of a fowling piece depends, to a considerable extent, upon the rapidity with which it can be fired, and hence breech-loading gun have become justly popular. The great care taken in every department of the extensive works of ETHAN ALLEN and the nicety with which every part of these pieces are fitted, assure us that they can be relied on, and that no better are to be had. The "shells" used in the above described gun being drilled and turned from decarbonized steel, can be re-loaded an indefinite number of times, and will generally last as long as the gun itself. They are also nickle plated which entirely prevents them from rusting.

ALLEN'S RIFLE.

NEW REVOLVER.

Metallic cartridges are also made at these works of the sizes suitable to their various manufactured goods. The machines patented by Mr. ALLEN for turning out their goods almost reduces their manufacture to a science. The complex machines for making these arms cannot be explained without drawings. Suffice it to say that the operations performed are astonishing. The works of this concern consist of two machinery departments, as they may properly be termed, 140x40, which are fitted with every tool necessary for turning out the best of work, all of which are kept in neat order. Then there is the engine room, boiler room, forge shop, where the shot-gun barrels are twisted and welded; assembling room and capacious offices. The main building is of brick; three stories high and the whole works covers a large area of ground. They are situated on the Boston and Albany railroad, and thus have excellent shipping facilities to all points. In consequence of the nature of their calling the men employed—some 100—are mostly skilled workmen, and certainly a more respectable or intelligent body of men is rarely found. The works are furnished with power by a CORLISS's sixty horse-power engine.

Professor Huxley on the Formation of Coal.

SUPPOSE we adopt Principal DAWSON's assumption, that one foot of coal represents fifty generations of coal plants; and, further, make the moderate supposition that each generation of coal plants took ten years to come to maturity—then each foot-thickness of coal represents 500 years. The superimposed beds of coal in one coal field may amount to a thickness of fifty or sixty feet, and therefore the coal alone, in that field, represents 500×50=25,000 years. But the actual coal is but an insignificant portion of the total deposit, which, as has been seen, may amount to between two and three miles of vertical thickness. Suppose it to be 12,000 feet—which is two hundred and forty times the thickness of the actual coal—is there any reason why we should believe it may not have taken two hundred and forty times as long to form? I know of none. But, in this case, the time which the coal field represents would be 25,000 ×240=6,000,000 years. As affording a definite chronology, of course such calculations as those are of no value; but they have much use in fixing one's attention upon a possible minimum. A man may be puzzled if he is asked how long Rome took a-building; but he is proverbially safe if he affirms it not to have been built in a day; and our geological calculations are all, at present, pretty much on that footing. A second consideration which the study of the coal brings prominently before the mind of any one who is familiar with palæontology is, that the coal Flora, viewed in relation to the enormous period of time which it lasted, and to the still vaster period which has elapsed since it flourished, underwent little change while it endured, and, in its peculiar characters, differs strangely little from that which at present exists. The same species of plants are to be met with throughout the whole thickness of a coal field, and the youngest are not sensibly different from the oldest. But more than this. Notwithstanding that the carboniferous period is separated from us by more than the whole time represented by the Secondary and Tertiary formations, the great types of vegetation were as distinct then as now. The structure of the modern club-moss furnishes a complete explanation of the fossil remains of the *Lepidodendra*, and the fronds of some of the ancient ferns are hard to distinguish from existing ones. At the same time it must be remembered that there is nowhere in the world, at present, any forest which bears more than a rough analogy with a coal forest. The types may remain, but the details of their form, their relative proportions, their associates, are all altered. And the tree-fern forest of Tasmania or New Zealand gives one only a faint and remote image of the vegetation of the ancient world. Once more an invariably-recurring lesson of geological history, at whatever point its study is taken up—the lesson of the almost infinite slowness of the modification of living forms—the lines of the pedigrees of living things break off almost before they begin to converge.

Finally, yet another curious consideration. Let us suppose that one of the stupid, salamander-like Labyrinthodonts, which pottered, with much belly and little leg, like FALSTAFF in his old age, among the coal forests, could have had thinking power enough in his small brain to reflect upon the showers of spores which kept on falling through years and centuries, which perhaps not one in ten million fulfilled its apparent purpose, and reproduced the organism which gave it birth, surely he might have been excused for moralising upon the thoughtless and wanton extravagance which nature displayed in her operations. But we have the advantage over our shovel-headed predecessor—or possibly ancestor—and can perceive that a certain vein of thrift runs threw this apparent prodigality. Nature is never in a hurry, and seems to have had always before her eyes the adage, "Keep a thing long enough, and you will find a use for it." She has kept her beds of coal many millions of years without being able to find much use for them; she has sent them down beneath the sea, and the sea-beasts could make nothing of them; she had raised them up into dry land, and laid the black veins bare, and still, for ages and ages, there was no living thing on the face of the earth that could see any sort of value in them; and it was only the other day, so to speak, that she turned a new creature out of her workshop, who by degrees acquired sufficient wits to make a fire, and then to discover that the black rock would burn. I suppose that nineteen hundred years ago, when JULIUS CÆSAR was good enough to deal with Britain as we have dealt with Zealand, the primæval Briton, blue with cold and woad, may have known that the strange black stone, of which he found lumps here and there in his wanderings, would burn, and so help to warm his body and cook his food. Saxon, Dane, and Norman swarmed into the land. The English people grew into a powerful nation, and nature still waited for a full return for the capital she had invested in the ancient club-mosses. The eighteenth century arrived, and with it JAMES WATT. The brain of that man was the spore out of which developed the steam engine, and all the prodigious trees and branches of modern industry which have grown out of this. But coal is as much an essential condition of this growth and development as carbonic acid is for that of a club-moss. Wanting coal, we would not have smelted the iron needed to make our engines, nor have worked our engines when we had got them. But take away the engines, and the great towns of Yorkshire and Lancashire vanish like a dream. Manufactures give place to agriculture and pasture, and not ten men can live where now ten thousand are amply supported. Thus, all this abundant wealth of money and of vivid life is nature's interest upon her investment in club-mosses, and the like, so long ago. But what becomes of the coal which is burnt in yielding this interest? Heat comes out of it, light comes out of it, and if we could gather together all that goes up the chimney, and all that remains in the grate of a thoroughly-burnt coal fire, we should find ourselves in possession of a quantity of carbonic acid, water, ammonia, and mineral matters, exactly equal in weight to the coal. But these are the very matters with which nature supplied the club-mosses which made the coal. She is paid back principal and interest at the same time; and she straightway invests the carbonic acid, the water, and the ammonia in new forms of life, feeding with them the plants that now live. Thrifty nature! Surely no prodigal, but notable of housekeepers!—*Contemporary Review.*

The Warsop Aero—Steam-Engine.

THE following interesting paper with reference to the results of the injection of heated air through the bottom of steam boilers, was recently read before the English Institute of Mechanical Engineers, by Mr. RICHARD EATON, of Nottingham: "The principle of this engine consists in injecting a continuous supply of heated air into the bottom of the boiler, whereby the water in the boiler is kept in a constant state of agitation throughout; and the result is found to be that the generation of steam is rendered more rapid, with considerable economy in the fuel consumed, while incrustation in the boiler and priming are prevented. The air, compressed to the boiler pressure by an air pump driven by the engine, or by a separate donkey engine, is conveyed to the boiler through a set of heating pipes fixed in the boiler-flues, and is thus heated to a temperature of

about 600 degrees, Fahr. by heat which would otherwise escape to the chimney as waste; and it enters the boiler through a pipe extending along the entire length of the bottom of the boiler, and perforated on the under side with a series of small holes for distributing the air throughout the water in the boiler. The quantity of air injected can be varied as desired, but the proportion found most suitable generally is twelve per cent. of the steam generated, the combined air and steam passing off to the engine. The plan has been tried principally with non-condensing engines at present; but the effect upon the vacuum in condensing engines is found to be a diminution of not more than two pounds in the vacuum otherwise obtained with steam alone. An important result of the employment of air in this manner is the entire prevention of incrustation in the boiler; and this result has been fully established by the experience of the boilers worked on this plan. Comparative trials have been made for a length of time with stationary boilers fed with water containing a large amount of deposit, and also with marine boilers; and in every instance there has been an entire freedom from incrustation, while similar boilers, working under the same circumstances, but without the air injection, have become seriously incrusted with earthy or saline deposit, requiring frequent cleaning out. Another important advantage found to attend the use of the air injection is the prevention of priming. So completely is this prevented, that marine boilers working at high pressure are, with the air injection, worked at a considerably higher pressure of steam, and with a consequent higher speed of the engines, than is practicable without the air injection on account of priming. The heated air injected into the boiler has, moreover, a direct evaporative action upon the water, equivalent to an increase of heating surface in the boiler; and this increase has an extra efficiency from the circumstance of the air being in direct contact with the water, instead of the heat being communicated through the medium of imperfectly-conducting metal plates."

On the Examination of the Bessemer Flame with Colored Glasses and with the Spectroscope.

By J. M. SILLIMAN, M.E., Adj. Prof. of Metallury, Lafayette College, Easton, Pennsylvania. Read at the Troy Meeting of the American Association for the Advancement of Science.

I. EXAMINATION WITH COLORED GLASSES.

IN the Bessemer process, the progress of the decarbonization is determined chiefly by the appearance of the smoke, flame and sparks which are emitted from the apparatus. Owing to the rapidity with which the reactions take place, it is highly important to catch the exact moment when the blast should be turned off. This is indicated by the color and brightness of the stream of gas issuing from the converter, and by this the moment of total decarbonization can generally be accurately determined by the naked eye. When, however, pig-iron of certain qualities is used (manganiferous, for example) this determination is very difficult; even those who have had much experience make frequent mistakes and find it impossible to produce the same quality of steel at every blow.

In order to intensify these flame indications, use has been made of the spectroscope, and also of various combinations of colored glasses. The former was first attempted by Dr. ROSCOE, and the latter by Mr. ROWAN, at the Atlas Works.

Mr. ROWAN experimented with a great variety of colored glasses, and obtained the best results by using three glasses, two of ultramarine blue and one of dark yellow. This little instrument, or chromopyrometer, as he terms it, is now in daily use at the Atlas Works, its indications being so marked and unmistakable as to render its use safe in the most inexperienced hands.

The following experiments were made at the Bessemer Steel Works of JOHN A. GRISWOLD & Co., in Troy, while pursuing the chemical course in the Winslow Laboratory of the Rensselaer Polytechnic Institute. In my observations on the flame I made use of the spectroscope, and also of a combination of colored glasses. This combination consisted of two light-yellow glasses and a blue one, through which the sunlight appeared of a deep purplish-blue tint; and as it differed slightly from ROWAN'S, it gave somewhat different results.

In order to reproduce the appearance of the flame at the different stages of the process, I prepared a plate consisting of about a hundred varieties of colors and tints, all of which were numbered and thus referred to a table which indicated their composition. They were also arranged to be seen with either a light or dark background. The use of this plate was of necessity limited to daylight, but the illustration and description are given as occuring at night in order to show its illuminating power.

At the beginning of the process, that which issues from the converter does not appear to be a true flame, but only an illumined stream of gas carrying with it innumerable red-hot pellets of iron. This gas has scarcely any illuminating power, extends but a short distance from the mouth of the converter, and is sometimes sheathed with a whitish smoke. Seen through the glasses, the flame and sparks have a deep crimson color, the converter is invisible, and at the base of the flame is a crimson band which continues throughout the process.

As the reaction continues, this stream of gas grows brighter and more elongated, and after a few minutes a small pointed whitish flame appears, which suddenly increases in size. At this instant the blast pressure falls from twenty to eighteen pounds.

When viewed through the glasses, the upper part of the converter comes dimly into view, and the flame and pellets of iron appear of a lighter color, while the fragments of slag which begin to be thrown out are of a deep red. This difference in shade between the iron and slag thrown out is probably entirely owing to the lower temperature of the latter, for the reason that while the iron is discharged from the metallic bath the slag is washed up on the sides of the converter, and can be seen clinging around its mouth in a spongy mass until detached and thrown out by the blast. The greater porosity of the slag and its consequent more rapid cooling would also cause a difference of temperature.

In the second period the discharge of slag increases, and the flame is very bright and illuminating, with occasional dark streaks. Through the glasses at the beginning of this period the flame is of an ashy blue color with streaks and flashes of crimson; the edges being sometimes of a purplish hue. At this point surrounding objects are illuminated, and the converter becomes distinctly visible. A wreath of crimson is seen surrounding the flame where it strikes the chimney. By the middle of this period the crimson almost entirely disappears from the body of the flame, leaving only a slight cone at its base, and a border of greenish hue makes its appearance, and gradually grows more decided. Streaks of a dark blue color are also seen in the body of the flame.

The beginning of the third period is scarcely indicated to the naked eye, though the flame becomes somewhat weakened, and after a few minutes shows dark streaks running through it. Through the glasses at the commencement of this period the rose-colored cone begins to expand and deepen, the greenish sheath is more decided, while streaks of dark and green are visible. After a few minutes the change becomes very rapid, a few seconds only being required to reduce the flame from rose-color to the deep crimson non-illuminating gas, as at first, and again the converter is lost to view, by which time the blast should have been turned off.

The gradual fading of the crimson from the beginning of the blow and its deepening at the termination of the process, as well as the crimson band at the base of the flame and the wreath of crimson surrounding the flame at the chimney, tend to confirm Mr. ROWAN'S views, which are, that the different shades of crimson are due to changes of temperature. The stream of gas which comes from the mouth of the converter at the beginning of the process being illumined from within, derives its color from the metallic bath, the temperature of which, owing to the combustion of silicon, increases more rapidly during this period than at any other.

The crimson band at the base of the flame and the wreath of crimson at the chimney might also be accounted for by this theory. The flame rushing from the mouth of the converter has a tendency to create a vacuum at its base around the converter's edge, and thus to cause a wreath of flame to pass over this surface and by consequent cooling produce the crimson band. The wreath of crimson at the chimney may be also due to the cooling of the flame consequent upon deflection.

It is true we have a seeming contradiction to this theory in the rose-colored cone extending from the base at the centre, which we would naturally consider the hottest part of the flame; but, as in the flame of the Bunsen burner, the hottest part is in its outer sheath, the conditions of combustion in both being similar, it is probable that that part of the flame occupied by the cone is at a lower temperature than that surrounding it.

The green streaks in the flame are most intense when the manganese spectrum is brightest; and as the color of the flame when the spiegeleisen is added is also green, we are led to suppose them due to the presence of manganese.

On two occasions simultaneous observations were made with the spectroscope and the colored glasses; but with the exception of that just mentioned, and the changes at the commencement and termination of the blow, no striking coincidence was noticed.

II. EXAMINATION WITH THE SPECTROSCOPE.

The science of spectrum analysis is yet in its infancy, and there has been no scientific investigation, perhaps, which has been more contradictory in its results than that of the Bessemer flame. The first application of the spectroscope to the analysis of the Bessemer flame was made in 1862 by Dr. ROSCOE at the works of Messrs. JOHN BROWN & Co., in Sheffield. Soon after this it was in constant use in Brown's works for controlling the process. It was next introduced at Crewe, and from there said to have been taken to Seraing, in Belgium, in 1865.

Roscoe's account of the general appearance of the spectrum has not altogether been verified by subsequent observers. His not having seen any line beyond 80° indicates an imperfection in his instrument. He, also, is the only one who claims to have seen the sodium line as an absorption band, or who professes to have detected the lines of nitrogen and hydrogen in the Bessemer spectrum. His spectroscope was so arranged that the spectrum of the Bessemer flame was seen in the upper half of the field of view, while the spectrum with which it was to be compared was seen immediately below. The spectrum of the flame was thus compared with the following spectra:

1. Spectrum of electric discharge in carbonic oxyd vacuum.
2. Spectrum of strong spark between silver poles in the air.
3. Spectrum of strong spark between iron poles in air.
4. Spectrum of strong spark between iron poles in hydrogen.
5. Solar spectrum.
6. Carbon spectrum—oxyhydrogen blowpipe supplied with olefiant gas and oxygen.

The coincidences observed were very few, and totally failed to explain the value of the Bessemer spectrum. The lines of the well-known carbon spectrum did not occur at all, either as bright lines or absorption bands, nor was any coincidence observed between the lines of the Bessemer spectrum and those of the carbonic oxyd vacuum tube. The lines of lithium, sodium and potassium were strongly marked and identified with certainty. He found that three fine, bright lines between E and *b*, shown on the plate at 66½°, 67°, 67½°, coincided with those of iron; and in place of the red hydrogen line C, he discovered a black band which he considered an absorption band, and states that it is better defined in wet than in dry weather.

In Austria, Professor LIELEGG followed up this subject with great perseverance, and gave more extended accounts of the varying character of the Bessemer spectrum during the different stages of the process. His experiments were made at Gratz, where the spectroscope was afterwards used with great success in controlling the Bessemer process; but at Königshütte, where dark grey manganiferous iron was used, it was found that the indications which in other works so plainly determined the moment of decarbonization were unreliable. In this case the lines whose disappearance is to indicate the exact point of time for ending the process, disappear too soon. During the period in which the spectrum is brightest, among the glowing vapors and gases that stream from the converter, carbonic oxyd, next to nitrogen, is most abundant, and it is for this reason that the first investigator, ROSCOE, expressed himself as confident that the numerous lines of the spectrum were caused by this gas, although he could obtain no coincidence.

BRUNNER* states that "no part of the Bessemer spectrum is ever visible in the flame when the converter is heated for the first time after being re-lined, but that when the lining is not new, LIELEGG'S group of green lines (CO_y) appears in the spectrum, which then contains also the lines of potassium, sodium, and lithium;" from which he concludes that this spectrum is not to be identified with carbonic oxyd, but must be produced by other constituents of pig-iron. Others state that the Bessemer spectrum is sometimes visible while the converter is being heated after a blow. I made an observation of the flame from the converter while it was being heated the first time after being re-lined, and obtained with great distinctness the potassium, lithium and sodium lines, but have not under any circumstances detected any other lines while the converter was being re-heated.

LICHTENFELS, by a series of simultaneous comparisons of the manganese with the Bessemer spectrum, found the lines in the blue and green fields to completely harmonize in the two spectra. The violet manganese line which had been seen by some, he could not detect in either of the spectra. I have never observed it, but Dr. WEDDING, who has summed up the observations of others, states that he has repeatedly seen it. Its position is at 135½°.

The instrument used in my investigations was constructed by ALVAN CLARK, of Cambridge, and consists of an equiangular flint-glass prism, in a metallic box, into the sides of which, at the requisite angles, are screwed an inverting telescope with a magnifying power of six, and a tube containing the adjustable slit and lens for rendering the rays parallel; also a tube with a scale, which is placed at such an angle that it is reflected from the surface of the prism through the telescope to the eye; it can be so adjusted as to appear along the upper edge of the spectrum. I was provided with Bunsen's plates of spectra on a large scale, and in order to adapt them to the scale in my instrument, I took the spectrum of the sun and obtained Fraunhofer's lines with great distinctness. Two characteristic lines in the solar spectrum were then noted, one of which appeared at 37° and the other at 117°, and a space measured equal to their distance apart as given on Bunsen's scale. This was divided into eighty equal parts, and the division extended in both directions. By the application of this scale to Bunsen's, I found that the remainder of Fraunhofer's lines in my instrument exactly coincided with their position on his plates. The correctness of the new scale was also proved by other coincidences. By moving the prism, Fraunhofer's lines will vary slightly in their relative distances apart, but in no possible position in which I could place the prism, could I obtain the sun-spectrum as given by WEDDING in connection with the Bessemer spectrum; if the spectrum given by him was obtained by the use of bisulphid of carbon in his prism, that substance causes a greater variation than I had supposed.

[TO BE CONTINUED.]

The British Navy.

WE hear so much dissatisfaction expressed concerning our own Navy, that it is quite refreshing to find that after all we are not so much worse off than our neighbors. The following article is taken from *The Engineer*, a London paper, which is regarded in England as authority in such matters:—

"Without an army for the defence of Great Britain or the protection of our colonies from invasion, the sole hope of the nation lies in a fleet which has hitherto been considered, and not improperly so, the finest that ever floated. Take away our ironclad ships, and England dwindles at once into a position much lower than that of Turkey—worse than that of Greece. Instead of being even in name the mistress of the world, she is but a puppet to be played with by more politic statesmen than any we can boast of. Insulted, robbed, degraded, England would be, finally, plundered of all worth having, and reduced to the extremity of begging for a little grace, a little mercy; or of uniting herself to her conqueror, gilding the chains of slavery, and calling them treaties of peace. In the absence of naval strength England has no strength whatever. Lacking that, Prussia, reinstated France, America, or Russia might each or all, dictate to her what terms they pleased, and take or leave her her wealth, her institutions, or her laws, as seemed to them best. Such statements seem trite. 'Of course it is all very true, but it has been said, over and over again; why tell us what everybody knows?' We repeat the story because it is of the utmost possible importance that due attention should be paid to it—because we are, and we say it advisedly—in danger of losing our fleet; because recent events tend in a way to show that the ships we are building, and have built for some time past, are not of a kind to serve us in our hour of need. It must be remembered that ships are like nations. They succeed each other generation by generation. A country may possess to-day an irresistible naval force, which will by the operation of time and various causes so wear out and

* Van Nostrand's Eclectic Eng. Mag., vol. I., page 508.

shrink away, that in a score of years it shall be of no value whatever as a means of offence and defence. Fleets demand continual additions. Ships are either superseded by better vessels, or, worn out by age and hard service, sold to the breakers every day. These must be replaced. Thirty-two years is said to be the duration of a generation of ships. It is true that vessels more than thirty-two years old may now be found doing service of a sort, so may men of seventy or eighty; but it is not the less true that if we were involved in a war tomorrow the ships of a past generation would be useless. It behoves us to consider well whether the war vessels which we rely on to take their place are competent to do as good service —whether the children will prove as good men as their fathers and grandfathers,

"The unarmored wooden ship of war has practically disappeared; its place has been taken by the iron built iron-clad; and although the system under which the change has been effected has not heen as perfect as could have been desired, past Lords of the Admiralty and their officials have succeeded in building powerful ships able to take the sea in all weathers, and beyond question competent to carry their crews in greater safety under adverse circumstances than any other craft afloat. Differences of opinion have been expressed concerning the arms, the armor, and the speed of our ships. As a rule, however, these disputes have turned, not on whether our fleet was good or bad as a whole, but as to whether, admitting it to be good—a fact which no sensible man knowing something of the subject disputed—it might not have been made still better. The 'Bellerophon' affords a case in point. The merits of no ship in the navy have been more keenly disputed. Yet the principal point at issue was, after all, not whether she was a good or bad ship, but as to whether she would or would not have been a very much better ship if she had been made fifty feet longer. It is to be feared, however, that the construction of our navy is likely to assume a new phase altogether; that the rising generation of ships will prove deficient in a way not dreamt of hitherto, and that, in a word, we are drifting into a system of design and construction which will supply us with ships possessing every good quality under the sun, yet lacking the one qualification—the power of going to sea—without which all other good qualities are useless. Far be it from us to raise a needless cry of alarm, or to echo the senseless clap-trap which, consisting in the denunciation of everything pertaining to Admiralty management, passes with some people for honest and competent criticism. We have no intention of asserting that our naval supremacy has ceased to exist; but we do say that unless very great caution is used, and much care is taken to prevent ideas, good in themselves, from being pushed to extremes and so spoiled, we may in a year of two find ourselves in possession of a young fleet which will be the laughing stock of all sensible men. A great many mistakes to which we shall refer presently, have recently been made at Whitehall; but standing alone they need not excite half the apprehension they have excited in certain quarters. The real danger lies not in the mistakes themselves, but in the possibility that they will be repeated. The true cause of alarm lies in the incompetency of the Lords of the Admiralty. It must be sought, not in the fact that they have sent one ship to sea which went to the bottom in a gale, but in the probability that they may, for want of proper knowledge, continue to perpetrate similar blunders. Mr. E. J. REED has put this view of the case very forcibly before the public in a very clever, though rather one-sided, article published in the last number of *Macmillan*.

"No man living knows more about Admiralty Lords and Admiralty management than Mr. REED, and his opinions on the subject therefore carry great weight with them. It is impossible to escape a feeling of alarm when we find him using such sentences as these—'It is no longer possible to take up our pen to write upon "the navy" without pain and humiliation.' 'I for one—possessing, as I may safely say, a fuller knowledge of the danger than the public can possibly possess —feel bound to express my apprehension that we may have witnessed in the loss of the "Captain" but the first of a series of naval tragedies.' 'I have dwelt at this length upon the "Captain's" case because the future of the navy is greatly involved in it. It is so, first, because the successful construction of the navy for the future must absolutely depend upon the disposition and ability of the Government to give its confidence to proper persons, and it is easy to see what risks we run in this respect; and, unhappily, the stronger the Government the greater the risk.' 'One thing is perfectly certain, viz., that good political administration will not supply the place of scientific skill in the Admiralty offices. The next consideration is, that if the Government is misleadable, there are plenty to mislead it.' Mr. REED then goes on to attack, with more force than fairness, the body of naval officers who have for some years past advocated the construction of turret ships. That a great deal which he says of certain of these gentlemen is true we cordially admit; but it must not be forgotten that the advocates of the turret system number in their ranks many naval officers who are not only ornaments to their profession as seamen, but possessed of a very thorough scientific education as well. If the Lords of the Admiralty were really competent, they would find no difficulty in riddling the chaff from the wheat. Mere talkers would very quickly be sent about their business, while the suggestions of practical and able men would meet with an attention which they now seldom or never secure. But it is impossible that the Board of Admiralty as at present constituted can escape making mistakes. Country gentlemen may be good politicians, but they must lack the scientific and practical training which can alone fit any man or body of men for the discharge of the duties which Lords of the Admiralty ought to perform. They do their best, no doubt, but they are either in the hands, as Mr. REED shows, of ignorant partisans and enthusiastic inventors, or of their own officials. The present Board of Admiralty could not prevent Captain COLES building the 'Captain,' nor Mr. REED from constructing six ships which will cost the country about £1,800,000, not one of which can, in the face of recent events, be considered safe in a gale. These ships are the 'Invincible,' 'Vanguard,' 'Audacious,' 'Iron Duke,' 'Swiftsure,' and 'Triumph,' already fully described and illustrated in our impression for May 15th, 1868, pages 357 and 358. It will suffice to state that they stand very high out of the water, carrying above the main deck battery two guns mounted on each side in a species of caponier, and totally unprotected from vertical fire. On inspecting the designs, we entertained grave doubts as to their stability, of which we wrote at the time as follows: 'We have said nothing of the stability of the Invincible type, nor shall we do more than point out that the elevation of the centre of gravity, and the increase of moment due to the overhanging sponsons must make the ship a roller.'

"Mr. REED was, in those days, a tower of strength on the subject of stability, and although the data in our possession justified us in feeling a little uncertain as to the seagoing qualities of the ship, they were not sufficiently ample to upset our confidence in Mr. REED's judgment. Our doubts, however, appear to have been but too well founded; the *Times*, which may be regarded as semi-official as far as concerns its military and naval intelligence, recently contained the following paragraph:

The "Invincible," 14, Capt. LAMBERT, in charge of Capt. C. FELLOWES and Staff of the Steam Reserve, left Plymouth Sound for the six hours' official steam trial. At the time of the "Invincible's" leaving the Sound she was at a draught of 21 ft. 8 in. aft, and 20 ft. 6 in. forward, her double bottom not being filled with water, and having no ammunition on board, the object of this trial being to test her new screws at a six hours' run of uninterrupted steaming. At starting the weather was quite calm, but prior to her return a strong breeze set in from the westward with proportionate sea. The ship, during the trial, was kept with the wind abeam, and when she first hove in sight on her return, steaming in from the southward, she had the appearance of being almost on her beam ends; and as she approached the Sound, it became evident that she was heeling over 17° to 18°, and the greatest anxiety prevailed on shore for the safety of the ship. Although the "Invincible" heeled to this extent, she had not a stitch of canvas set, and her topgallantmasts were on deck. It is therefore certain that even if the water ballast and ammunition were on board, the ship would be unsafe under canvas.

"The 'Iron Duke' and 'Audacious' have been put through their inclination trials with equally unsatisfactory results, and the *Times* has—erroneously we must believe—asserted that the 'Monarch' has been found so unsafe that she will not be allowed to join the Channel Squadron, her place being taken by the 'Achilles.' Mr. REED has addressed a letter to the *Times* on the subject, which we reproduce elsewhere. It will be seen from this that Mr. REED admits that in the case of the 'Invincible' some ballast will be necessary. In point of fact, the 'Iron Duke' is to be fitted with no less than 360 tons of permanent ballast, consisting of concrete and iron borings, filling up the space between her two skins; and her masts are to be shortened. We should like to know how far her main deck, plated with ⅝ inch steel on 3½ inches of fir, will then be above water. We confess that we find nothing very reassuring in Mr. REED's statements. We cannot think it possible that a really competent Board of Admiralty would have permitted the construction of a ship which heels from 10° to 18° without a stitch of canvas spread; nor do we think it probable that the presence of even 360 tons of ballast can make such a ship safe under sail.

"We feel that in alluding at such length as we have done to this type we have apparently digressed, but such is not the fact. Mr. REED tells us that the future of the navy is in peril, a point on which we fully agree with him. But we are very well aware that others think very differently, and it is absolutely necessary, therefore, to cite facts in proof of our arguments. The 'Captain' went to the bottom, according to Mr. REED, because the Admiralty was incompetent. We hold that the 'Invincible' style of ship was called into existence for precisely the same reason. It would extend this article to an unreasonable length were we now to enter on an explanation of our views as to how and of what the Board of Admiralty should be constituted. We shall return to the subject in an early impression.

Three Different Methods of Sinking Through Running Sand.

UPON this subject a very practical paper was read before the South Midland Institute of Mining, Civil, and Mechanical Engineers, at their meeting in Wolverhampton, last Monday. The author and reader of the paper was Mr. JAMES COPE, F.G.S., mining engineer, of that town, the honorable secretary. The Chairman was Mr. J. P. BAKER, the Government Inspector of Mines for the district, who is the President of the Institute. There was a considerable muster of members, who had been drawn together by the subject of the poor. Because of the wide importance of the theme to all colliery engineers in particular, and because the author has had very extensive experience in such work, we have taken steps to obtain as full a report of the proceedings as the rules of the Institute will allow.

Mr. COPE said: This important subject I have well considered from my long experience in several collieries under my supervision. Having tested these methods of operation, it gives me much pleasure in laying before you the different plans adopted by me to accomplish the same. You will perceive from the drawings made, showing each distinct method which will illustrate the principles requisite to surmount the very great difficult experienced in sinking through running or quicksand, and by which means a large amount of expenditure may be saved, and the operations may also be productive of good and beneficial results by extending and opening mines which have been heretofore abandoned, owing to the defective sinkings. I will now proceed to give you the particulars. After proving the thickness of the sand by boring with the usual applian es for such purpose, provide four strong deal baulks, thirty-five feet long, and from twenty-four to thirty inches square, and frame them one across the other, as exhibited in the drawing. It will be necessary to form a diagonal framework to support the centre of the baulk, and to carry any weight you may require to lift: this framework will supersede the common pit-frame for winding up the earth with gin, etc. If the first stratum proves to be strong clay, combined with loam and sand of considerable thickness, it should be quartered in with nine-inch brickwork, after which apply strong hanging-rods or chains, with feet to clip the bottom of the curb, and tightened up with a screw wrench at the nut, or bur, that is attached to the rods or chains which run through the baulks. The internal diameter of the first setting of bricking should be in accordance with the depth of the land, and also the size of the shaft required; in my opinion, twelve feet six inches in the clear will be sufficient under ordinary circumstances. The second setting, which will be about eleven feet interior diameter, may be more difficult to sink through, as the surface-weight will pass heavily upon the softer strata, and cause a bulging of the brickwork, in which case great care must be taken by lacing the shaft with elm boards, five-eighths of an inch in thickness fastened from curb to curb with nails of the best quality, which will combine the whole work together. If you have much water in the strata apply a pump at once to keep it clear, and your work will be much firmer. When this setting is completed, fix the hangings as on the first or top setting, then proceed with the third, which will be the completion of your difficult top work, preparatory for the coffering. Coffering is a portion of strong brickwork, commenced upon a firm foundation, by placing an oak curb, made to a complete circle, which must be well bedded in cement, afterwards the coffering may be proceeded with, and must be continued until the whole space required be raised three feet above the top springs, or if necessary to the surface of the earth.

It will be well to observe that the workmen employed for coffering pit-shafts, where there is a great quantity of water, cannot be too careful in mortaring with hydraulic cement and well placing the bricks, as every joint must be crossed, and they must not let two joints come in contact one with another, or it is possible the coffering will burst, and the work become very much damaged. There should be three courses of brickwork in coffering out water in pit-shafts: the front course, the grouting course, and the back course; the grouting course must be sunk or placed about 1½ inches lower than the front and back course, to prevent the contact of the joints. I would recommend or advise all mining proprietors who have to coffer out water to make use of two plugs instead of one, and to bring up the air from the bottom of the coffering in a proper manner by wooden troughs, about five inches by two inches in the clear, perforated on the back side for carrying the air to the surface, then proceed to fill up the space between the back casing and the main coffering with good riddled soil, as this material is the best for coffering purposes. Above all, make use of the best black or hydraulic lime that can be obtained, as it will make your work stronger, and enable it to set in water. The best brick for making firm coffering is what is called the compass brick, as the joints fit both front and back; be careful to select well burnt bricks, as soft ones will cause the work to decompose. As the coffering advances upward the lacings may be taken away, and used again for like purposes, if required.

The second plan is a method of sinking through running sand with tubs or cylinders, made either of cast or wrought iron, free from oxidation, and well coated with good naphtha black varnish, which must be allowed to become dry before being used, to prevent corrosion. I am in favor of wrought-iron, although many persons use cast-iron. It has been often the case that large portions of cast-iron cylinders have been ruptured by the ponderosity or pressure of the earth. The strength of cast-iron cylinders for a depth of 25 to 30 yards deep ought not to be less than 1 inch to 1¼ inches thick, and made of the best grey iron. Wrought-iron cylinders should be ¼ inch thick, and made from the best plates that can be obtained. This will be found to be the most certain and substantial means of avoiding the inevitable difficulty often experienced in accomplishing the desired end. The proportions of the above sorts of materials are very often decided upon by men of no experience in such expensive matters. I have known the cost of sinking through running sand to a depth of 30 yards to be upwards of £5,000, the greatest portion of which has been caused by the unskilful operator. The form of the bottom of the leading tub or cylinder, as is represented in the drawing, should be bell-mouthed; and the edge or cutting part as sharp as convenience will allow, so as to cut its way through the sand. It has been found by experience that when the tubs or cylinders have been made too broad at the leading or bottom end, that large stones have come in contact, and retarded the progress of the workman's operations; and, again, the leading tub or cylinder of this description cannot penetrate into the earth like the one that has a cutting edge. When putting in tubs or cylinders see that the workmen are particular in jointing the work firm together, whether by being riveted or screwed together with gutta percha rings, ⅛-inch in thickness, and well saturated with coal tar. The whole should then be screwed firmly together, and the flanges of the internal parts next to the circle of the shaft made perfectly water-tight. I must say I am in favor of riveting instead of screwing them together. The internal flanges should be about five inches wide, which will be sufficient to enable the brick-work to be laid thereon. When the tubs or cylinders are riveted or screwed together one upon the other, they may be suspended from a powerful pair of pulley-blocks, and lowered gradually as occasion may require. Sometimes it will require heavy pressure on the top of the tubs or cylinders to force them down; such will be the case when the earth is so much combined around them on all sides as to keep them from sinking with their own

weight or gravity. After the tubs or cylinders have run their whole length till they have rested upon firm ground you may consider all to be safe. The next operation will be to cleanse the bottom of the tub or cylinder, to see whether any leakage prevails; if so, and it be not bedded regularly all the way round, it will be necessary to ease the parts a little that bind the most till it is quite secure. This will complete the most difficult part of the work.

The third method related to sinking by pile-driving. By this method (said the author) great difficulties have been overcome. It is seldom necessary to use piles in the first or top setting, which should be bricked with double bricking. In the next place, after you have sunk the top length, and made it safe by bricking and lacing down to the first bed of sand, then lay down your baulks at a proper distance one from the other, put on the cross-baulks and frame-work; proceed, then, at once to place your hanging chains or rods to the top setting, well screwed up to your baulks; dig into your sand, and if it will not stand, lay down your curb, well plated and screwed together firmly, and plumb your work. You will then proceed to drive your piles with wooden mauls, hooped with iron hoops near the face, and start the pile at an angle of 60°. The operation requires some muscular power, and will disable the best operators in a short time. The piles should be charred elm timber, about seven or eight feet long, one and three-fourths inches thick, and from four to six inches wide. After you have driven down the whole circle of piles, apply about six wheelwrights' screw-jacks, and proceed to screw them, to force down the circle into the sand, so that you may cleanse and send up the sand as fast as you please. As the curb sinks lower and lower into the sand, till your jacks are quite up to the top, slacken them one by one, and set them upon plugs of wood till you have forced the curb low enough for the next set of piles. Then brick up from curb to curb, and make ready for driving the next set of piles as before. Move your hanging-rods to the last curb, take off the screw-jacks, and bed your pile curb. As it will be necessary, perhaps, to drive four or five sets of piles, the work should be well secured with good lacings, as directed in the foregoing part, because the pressure of the earth will gradually act upon them. As you proceed to cleanse the earth in driving the second set of piles, you will find that the first set of piles will be forced to a perpendicular against the setting below, by the unavoidable pressure of the earth acting upon them. By thus acting, the piles form a sort of tub, enclosing the brick-work. In this method of sinking it will require coffering, which must be attended to as in the former coffering, and in precisely the same way.

The honorable secretary explained that he had not given the cost, because he did not wish the benefit of the information to go to the general public through the reporters. He would, however, give the information in full in the next published volume of the Transactions of the Institute, where, too, the diagrams would appear.

The President, Her Majesty's Inspector of Mines for South Staffordshire, who pointed to the diagrams as the secretary proceeded with his paper, expressed himself in very high terms of the great value of the document. It was, he said, one of those papers which were of the utmost value to the Institute. The subject had not, however, been by any means exhausted. It was one which was of considerable interest to that locality, and was quite of moment to the North of England, and some other mining districts, in respect of which he was sure that no little astonishment would be felt by the members of the Association, if they only knew what had been the difficulties and what the class of work which had characterized sinkings through the sand there. The discussion upon the paper could not be conducted with so much certainty or so much value as would have been the case if the honorable secretary had given the cost of each plan respectively.

The reporters having intimated respectively that they would give publicity to no part of the proceedings over which the Institute desired to possess the right of publication, the honorable secretary promised to bring the figures to the next meeting.

The President approved the step, and suggested that, till the next meeting, the discussion should be adjourned. (Applause.) The costs would be of the more value, because they were those which had actually been incurred under Mr. COPE's superintendence. Than Mr. COPE there was no man in that part of the kingdom better able to prepare a paper upon the question. (Hear, hear.)

When the President pressed the members to contribute as much information as their respective experiences afforded, Mr. SILAS BOWLEY proceeded to explain what was the plan which he, and he believed most of the mining engineers of the district, adopted.

The President interposing, expressed an earnest hope that Mr. BOWLEY would make his remarks the subject of a paper, to be read when the discussion should be resumed. (Applause.)

In reply to Mr. GILDEROY, of the Prestatton Colliery Company, who, it was made known by Mr. T. ROSE, a Vice-President, had come all the way from North Wales to hear the paper, the honorable Secretary said that the system which he recommended was the second in order. When Mr. GILDEROY came to see the cost of that method, he would well understand why he recommended it.

After some reference had been made to a method by one of the members for making finished iron without puddling, which is mentioned in another column, the Secretary drew attention to a visit which the Council had made to some sewerage sinkings at the east end of the Collegiate Church in Wolverhampton. These showed that the Permians existed there at the depth of nine or ten feet from the surface. The honorable Secretary indorsed the statements upon the subject, which were made public in last week's *Mining Journal*.

Mr. E. HULL, M.A., F.R.S., F.G.S., the Director of the Government Geological Survey of Ireland, was duly elected an honorary member of the Institute, on the proposition of the past President, supported by Mr. T. ROSE and others; and members spoke of the honor which the Institution acquired by having so distinguished a geologist and writer upon its list of members. In response to an invitation from the past President (Mr. HENRY BECKETT, F.G.S.), Mr. HULL had consented to the election, in a letter read at the previous meeting.

The President declared the meeting at an end, and then drew the attention of the members to what had the appearance of a section of an immense fossil fish, that had been found in the steam coal in a colliery on the other side of the Rhondda Valley. It was shown by Mr. THOMAS WALKER, a member of the Institute, who has an interest in the colliery.—*London Mining Journal.*

Mining Statistics of Great Britain.

FOR the following summary of statistical information, collected and arranged by Mr. ROBERT HUNT, F.R.S., Keeper of Mining Records, we are indebted to the English *Colliery Guardian*. The publication of the report has, we understand, been delayed by the severe illness and slow convalescence of Mr. HUNT, but he kindly permits the use of a part of the returns by the press before the publication of the report which is said to be of remarkable accuracy and detail. It will be given to the public in the course of a few days.

The production of coal for the past three years shows the following increase:—

1867	104,500,480 tons.
1868	103,141,157 "
1869	107,427,557 "

This will be to some extent accounted for by the increase in the make of pig iron. The production of our blast furnaces having been in

1867	4,761,023 tons.
1869	4,970,206 "
1869	5,445,757 "

Our exports do not show a corresponding increase. The exportations of coal, coke, anthracite, and patent fuel, having been in

1867	10,565,829 tons.
1868	10,744,945 "
1869	10,967,062 "

The great advance, therefore, has been in our home consumption, and must be referred chiefly to the renewed activity of our manufactures. An examination of the returns showing the movements of coal will prove this to have been the case.

EINERALS RAISED IN 1869.

Description of Minerals.	Quantities—Tons.	Value.
Coal	107,427,557	£26,856,382*
Iron ore	11,508,525	3,734,560
Tin ore	14,725	1,027,805
Copper ore	129,953	519,912
Lead ore	96,866	1,189,030
Zinc ore	15,533	49,366
Iron pyrites	75,948	41,023
Arsenic	2,561	11,464
Gossans, ochres, &c.. retured	709	943
Gossans, ochres. &c., (estimated)†	5,000	4,000
Wolfram and tungstate of soda	25	323
Manganese	1,558	7,897
Barytes	5,987	3,415
Clays, fine and fire estimated)	1,200,000	45[illegible],000
Earthy Minerals, various (estimatd)	... .	670,000
Salt	1,250,000	687,500‡
Total value of the minerals produced in the United Kingdom		£35,252,120

METALS OBTAINED FROM THE ORE ENUMERATED.

Description of Metals.	Quantities.	Value.
Iron, pig.....tons	5,445,757	£13,614,397
Tin "	9,760	1,201,456
Copper "	8,291	644,065
Lead "	73,259	1,397,415
Zinc "	4,500	92,400
Silver.....ounces	831,891	207,972
Gold "	18	62
Other metals (estimated)	.....	500,000
Total value of metals produced		£17,657,767

ABSOLUTE TOTAL VALUE OF THE METALS AND COAL, WITH OTHER MINERALS (EXCEPTING BUILDING STONE, LIME, SLATES, AND COMMON CLAYS PRODUCED IN THE UNITED KINGDOM IN 1869.

Value of the metals produced in the United Kingdom	£17,657,767
Value of the coal	26,856,382
Value of other minerals not smelted	1,935,042
Total value	£46,449,691

* Calculated before any charges for movement are added.

† The oxide of iron obtained from the precipitating works and mines is being largely used for gas purification. But this year it has been difficult to obtain reliable returns.

‡ Estimated at the value given in the return of the exports.

MINING SUMMARY.

Colorado.

The Central City *Herald*, Nov. 19, says: "During the past week work has ceased on quite a number of mines and claims on Quartz Hill, above Nevada. Still a large quantity of rich ore is being taken from the Roderick Dhu, Kansas, Flack, Gardner, and California. The Kent County also has a busy look, and several claims are being steadily worked. BRADLEY & CREE have lately put up a steam engine on this lode, and COLLINS & Co. one on No. 4 of the California. The latter claim, and Stalker's claim near by, continue to yield eleven-ounce ore. BENNETT & GUY, Bros., on the Kansas, have been taking out ore, running from ten to thirteen ounces in stamp mill. Mr. P. M. WILLINGHAM, agent for Colorado of the Rotary Stamp Mill Co., of Chicago, is putting up a ten-stamp mill of that kind at the Flack lode. This is a new thing in Colorado. It is said to have been a success in other localities. Mr. WILLINGHAM expects to have the mill in operation next week, when we will give a fuller account of it. Several parties working the Prize and Sudeberg lodes on Prize Hill, have had considerable difficulty, each side claiming that the other had trespassed on their property. A smoking-out process was tried, and finally injunctions were issued, and we expect the courts will decide it, as we have heard nothing of cold lead for some days. Dr. RAE is said to have obtained some very good results from his electrical process at the Myers mill, at Fall River. We are told he obtained $258 in gold by his process from ore that assayed $271 per ton. He uses the Dodge crusher and dry stamps for pulverizers and then places the ore in a copper-lined cylinder, wherein the electro-process comes into play."

THE OHIO MINE.

This mine, situated about two miles south of Cariboo, is improving in appearance, and already takes rank among the best lodes of Grand Island District. JOHN BAKER has a force of men engaged in working it, and also the Indiana, Eva, and other lodes in that vicinity He is sinking, and taking out fine-looking silver-bearing quarz from all of them. He will soon put up shaft-houses, and have things in condition for working these mines all winter. There is money in them, and BAKER intends to extract it. The location of the Ohio is not far distant from the Cariboo road, to which a road can easily be built at a small expense. This mine will soon be contributing large supplies of first-class ore for reduction. The assays from the Ohio have given a yield of from $1,400 to $500 per ton, the last considered an average of the ore of the pay vein. The crevice is well defined, and the quality of the ore steadily improves as work progresses.

THE CORRECT MINE.

The Georgetown *Miner*, Nov. 24, says of this mine: "The lode is situated on Republican mountain, above the Snow-Drift, and is owned by the Allegheny Silver-Mining Company, of Pittsburgh, Pa., HARRY C. CAMPBELL, Superintendent. There is a shaft on the vein fifty feet deep. West of this shaft, one hundred and twenty-five feet, a tunnel, eighty feet in length, strikes the vein sixty feet from the surface. The vein has been uncovered for a distance of 1,000 feet. The breadth of the crevice, between slickenside walls, is five feet. Sufficient has already been done on this mine to prove its value and to warrant the expenditure of more money. Eastern stockholders must be reminded that it takes considerable money to place a mine in complete working order. The Correct is placed in good-working condition, and we have no doubts concerning its capacity to yield a handsome per cent. on the money invested. The pay material, gray quartz containing sulpurets of silver and galena of more than average richness, is of great breadth, and gives some promise of what one may naturally expect to find farther down in the mine—good pay. Assays of first-class ore have yielded as high as $1,842 per ton in silver. Everything about the mine indicates that the management on the part of the Superintendent is that of more than ordinary ability. The work on the mine is well done for the present and the future. The house, built for the accommodation of the miners, is not only comfortable, but as neat and clean as the residence of a private gentleman. The work of development on the Correct is going on quietly and systematically, and ere long we shall have the satisfaction of chronicling cheering results concerning this mine."

THE MORRIS TUNNEL.

"The object of this enterprise, now in 270 feet," says the *Miner*, is to develop the mineral wealth of Columbia mountain. At a dis- of one hundred and seventy-five feet from the mouth of the tunnel, a large, true fissure-vein has been cut and a drift run west on the vein 100 feet. In running this drift the workingmen have crossed over the top of an ore-chimney. The outlines of the ore-deposits are clearly defined, and why sinking on this chimney has not commenced is a mystery to us. The ore is of surprising richness, $3,000 per ton, and yet, push the drift into the mountain, is the order from headquarters in the East."

MISCELLANEOUS.

We take the following items of news from the same paper:—"We learn from JOHN PALMER, of the Whale mill, that mining matters in the vicinity of Idaho are lively. Work is being actively carried on in the Edgar, Seaton and Whale mines. In the Edgar a contract has been let to take out fifty tons of ore. This ore now runs two hundred and fifty ounces per ton, just as it comes from the mine, without any sorting; and there is in the mine from ten inches to four feet of solid mineral. Last fall one hundred and twenty-five tons of ore from the Edgar was treated by Mr. BATEMAN, which yielded $167 coin per ton. The mine is to be opened in a thorough and systematic manner, and when we state that the lode has uniformly paid for all work done on it by the proceeds of the ore extracted, there can be no doubt but that the Edgar is to be one of our reliable mines. The Bunker Hill lode is situated on Columbia mountain, a short distance above the Nuckolls. We found M. P. PARKER, Esq., a veteran miner and prospector, developing his property with as much vigor and energy as though he were entering upon the age of young manhood. The discovery shaft, on the Bunker Hill has been sunk to a depth of thirty feet. The pay deposit, decomposed vein matter in the bottom of the shaft is about one foot in breadth. The vein has been uncovered at short distances for three hundred feet west and one hundred and forty feet east of the discovery shaft. The surface ore from this vein yielded a large per cent. of silver, and we are glad that the owners are possessed with the necessary pluck and energy to go down after the wealth their mine contains. Work on the Magnet has been resumed, with encouraging results. When depth is gained on this noble vein the owners will not be ashamed of thei faith in the richness of the ore deposit of their mine. The ore in the third level in the Terrible mine is increasing in richness and quantity. In the end of the drift, now about 200 feet west of the shaft, there is a most excellent showing of ore, and it is worth about 600 ounces per ton. The O'BRIEN lode, on Leavenworth mountain, about opposite the reduction works of the BROWN S. M. Co., is now being opened. The shaft is now about eight feet in depth, and discloses a pay vein of eight inches of sulphurets and galena. No assays have yet been made to determine the value of the ore. Capt. J. Cox, who has driven a tunnel on the vein on the Bismarck a distance of sixty-five feet, has let a contract to drive fifty additional feet on the vein. Ore lately taken from the vein gave a yield, by fire assay, of $1,600 per ton. The Bismarck is one of the mother veins of the district, and Capt. Cox avers it is the richest. The Tom Thumb, Leavenworth mountain, owned by FRANK WOOD & Co., is now being worked. The lode will be opened by a tunnel, which will follow the crevice into the mountain. The Tom Thumb is a good lode, and yields ore very similar to that of the Indigo. We are glad to be able to record the working of another mine which has laid idle for a long time. A new and very promising discovery has been made on Sherman mountain, not long since, and named Wild Mettle. An open cut twenty-seven feet in length, gaining a depth of thirteen feet from the surface, shows a good pay streak of grey quartz interspersed with galena and blende. This is a valuable discovery, and we trust the owners will develop their property. On Saturday last the International Silver Mining Company shipped a silver brick weighing 1,210 oz., coin va 1,100. Since our last report the STEWART Silver Reducing Compan have shipped silver bullion to the amount of $4,600. The C armer lode continues to turn out good ore. The mineral from the lower workings contains considerable brittle silver. The Ocean

Wave, on Leavenworth mountain, is furnishing good ore from the breast of the tunnel that is being run in on the vein. On Tuesday last the BROWN Silver Mining Company shipped a button of silver weighing 303½ pounds avoirdupois, 4,426 troy ounces, coin value, $5,532. Since October 1, 169 sacks of first-class Terrible ore has been shipped to England, and a further shipment of 200 sacks leaves Denver to-day. This last lot averages 111½ pounds per sack. Last week the owners of the Correct lode received a bar of silver bullion weighing 105·20 ounces, ·945 fine, valued at $128 67 coin. This was from Correct ore, treated at the German Reduction Works of HUEPEDEN & Co. A new discovery called the Raymond has been made in Spanish Bar District. One pan of dirt from the Raymond gave a yield of $25 in coarse gold. The ROCKAFELLOW lode, on Leavenworth mountain, is now in mineral. The last visit we made to this mine disclosed a large crevice of decomposed material, and now that mineral is struck, we hope to hear of some good sample assays from the ore. A. A. CONVERSE was in town a few days ago. He left with Mr. CUSHMAN, at the Bank, a specimen of native copper from the Freeland lode, Trail Run. Mr. CONVERSE informs us that he will run a level a length of two hundred feet into the Freeland lode this winter. We shall expect to hear of good results from this lode, as it is one of the largest veins in the country. The Sterling is yielding very rich ore. The Silver Plume is yielding $800 ore in considerable quantities. Drifting and sinking still continues with good results on the Snow-Drift. Eight men are employed on the mine. The Boston Silver Mining Association, operating at St. John's, Snake River, Summit county, have shipped, during the past week, one ton of lead riches, value not given."

The following items are from the *Register:* "Work on Quartz Hill tunnel is progressing steadily. It is now in 545 feet, without having struck any lode of good pay. The price for the present contract is $25 per foot, showing that the ground must be favorable. The price on the last contract was $39 per foot. The highest price paid since the commencement was $45 per foot. They now have first-rate indications of cutting another vein soon, as the water in the breast is rapidly increasing, and presents a milky appearance, as if coming from a large, soft crevice. The tunnel thus far has been driven by Colorado men, the stock being held by those who cannot in any sense be called capitalists. It has cost $26,000, and has never returned anything. This amount of work has been done at the lowest possible rates, and no money spent for show. Had an Eastern mining company started the work, their capital would have been exhausted in driving about 200 feet. We like the perseverance of this company, and sincerely hope they will ultimately make a big thing out of it.

"Mr. B. C. WATERMAN has recently sent five tons of first quality Flack ore to Swansea. He has also sold some eighteen tons to HILL'S smelting works, and has quite a pile on the dump. His mill ore from the same mine has, we think, kept twenty stamps in motion, but we are unable to give the yield of any of the ore. In company with A. M. JONES, he is also working the Cooper, which lies about sixty feet south of the Forks lode. On this they are down some eighty or ninety feet, and have a fine crevice of galena and copper pyrites mixed. About ten cords are lying on the dump waiting for reduction in WHITCOMB'S new mill, which will soon be in operatton. In the Eureka mill, Mr. WATERMAN has introduced the BOLTHOFF guide-box, which is highly spoken of by those who have examined it. This mill is so well arranged for water that no detention will occur during the coldest weather."

Nevada.

THE BUCKEYE MINE.

"This valuable mine, near Silver City," says the Gold Hill *News*, has recently changed hands. It is now owned by Mr. J. MCDONALD, of San Francisco, and work is actively resumed upon it to-day. It will now be systematically worked in through, mine-like style, giving employment to from thirty to sixty men, or more. It will not be long before the Buckeye will be added to the list of profitable mines in this section."

COPE DISTRICT.

The Elko *Independent* has the following intelligence from Mr. GEO. CARTER, recently from the mines of Cope District: "There has been quite a decrease of population in that camp. At the time of the election there were about 220 men there; now there are about 150. Many have left for the winter, with the intention of returning in the spring. Most of those left in camp are busy. Probably about twenty-five more will leave this fall; the balance are likely to be engaged during the winter. Three mills are now running—the Norton, Vance, and the Drew. The Norton mill has been running on rock from different ledges, but will this winter run principally on rock from the Belle of the West and the Excelsior. The Vance mill is running on rock from the Nevada and on some from Bull Run, which has boen packed over from that district. If snow does not impede travel, probably two more pack-trains from Bull Run will arrive. The Drew mill has been running principally on tailings and rock from the St. Nicholas."

BULLION SHIPMENTS AND DIVIDENDS.

The amount of bullion shipped from Pioche for the week ending November 12, was $40,748 49. "This," says the *Record*, "does not comprise the shipment of ELY & RAYMOND'S two mills in the Valley, as that is sent by way of Salt Lake, and is put on in Elyville, twelve miles on the road to Salt Lake City." "Last evening," says the *Revielle*, Nov. 18, "the Manhattan Company shipped the last of a lot of twenty bars of silver bullion, weighing 1,799 pounds, of the value of $29,635. It was shipped to New York through WELLS, FARGO & Co." According to the Gold Hill *News*, Nov. 19, "A dividend of fifty cents per share was declared by the Sierra Nevada Mining Company, payable that day. The Virginia and Gold Hill Water Company have also declared a dividend—No. 84—for October, of one-half of one per cent. on their capital stock, payable immediately."

SPRUCE MOUNTAIN—AN OLD TUNNEL.

The Elko *Independent*, Nov. 26, says: "The mineral wealth of Eastern Nevada is yet unknown, and even the most enthusiastic old prospector does not seem to realize the immense wealth that lies hidden within the reach of a few pick strokes of the earth's surface, and within a few minutes' walk of his humble camp fire. Every day we hear of new strikes, rich discoveries, men made rich, and communities built up upon what may seem to be the result of accident—the development of some new mine. These new developments might seem to men unacquainted with the vast resources of this country, to be rare; but to those who have spent their lives in mining will be regarded as a matter not to excite old miners, and will be by them regarded as one of the cases in which they were not in luck. The mining district which heads this article may be mentioned in this connection as one that old prospectors have thoroughly tested, and for want of enthusiasm, which characterizes new hands in the business, have failed to elicit from the public press or from the public sentiment that commendation it deserves, and therefore we take the liberty to make mention of a few facts in relation to it. The Spruce Mountain district is situated about forty miles southeast of Humboldt wells, in this county, upon a mountain which is thickly covered with pine and spruce timber, and as well watered as any mines in the country. The mines are of two classes; those on the south of the mountain are what is denominated as good milling ore or chloride; those on the north are what is denominated as the best quality of smelting ore or argentiferous galena. These mines have now been worked for about a year, during which time many assays have been made from the ores, both chloride and argentiferous, with the most satisfactory results; but the owners feeling confident they have their fortunes, have not seen proper to trump the fame of their mines to the world; they have chosen rather to let time and fact show what they had to present. A casual visit to the mines by one who is well known to this office develops the fact that Spruce Mountain is in the near future distined to be one of the most important mining districts in the State of Navada, and there are there to be found relics of great interest to the antiquarian. The mine owned and now being worked by J. B. OSBORNE, has a shaft down 120 feet, following a very rich silver-bearing lead. On the side of the mountain below is an incline tunnel running into and connecting with the shaft from above, showing evident signs of having been the work of human hands, and both shaft and incline showing the same characteristics of the shafts and tunnels now to be seen in the mining regions of Mexico and South America. In addition to these, later developments have proved that this is one of the richest mining countries yet discovered in Eastern Navada, as the Latham, Schuyler, or Osborne mines will prove. If any doubt exists in the mind of the explorer, let him examine the later discovery, below and near the Humphrey mine, recently developed by that hardy old pioneer, JERRY CRABB, and all doubts as to the wealth of the district will disappear."

WHITE PINE MINES AND MILLS.

The *News*, of November 19, says "that most of the mines are making extensive preparations for winter, building ore-houses, sheds over shafts, etc.; that there is not one of them working which has not fair ore in sight; and not one that does not yield a profit. South Aurora keeps up the steady yield of good ore, as is evidenced by the bullion shipments. There is also a large amount of fair ore hauled to the Stanford mill. The large ore house is nearly finished, and work can be carried on in the mine all winter. North Aurora has only fifteen men at work, half of them prospecting virgin ground, near the Earle, with the best indications. The others are taking out some good ore. In the Eberhardt, the developments are being followed up, and when wanted thousands of tons can be taken out with the least trouble. It will be like a large stone quarry. In the deep workings some of the old class of exceedingly rich ore has been found. WARD BEECHER yields as much, and as good rock as ever; the mine is coining money. In the O. H. Treasure, fine milling ore is coming out of the old upper workings, and the lower levels are being put in good shape. Fair ore coming out of Silver Wave, with plenty of low-grade in sight; drifting still going on in the lower levels. Wabash and Hemlock suit was decided last week in favor of a Philadelphia Company, who will immediately comence operations on a small scale. Another company is building a large ore-house over the main. Most of the mines of the Base Metal range are taking out ore. At Mount Ophir the Trench keeps up its reputation, taking out plenty of rich ore. Caroline and Amador have been making large shipments of first-class ore to England. Robinson is extracting fair rock. Mount Hope is in good ore; a drift has been run to connect with a shaft higher on the hill. At Carbonate City, nearly every mine is working. Imperial has been shut up for the winter; the mine as it stands shows immense quantities of high-grading smelting ores. Yosemite and Uncle-Sam ore is being hauled to the Powers furnace. Jennie A is improving daily; The force took out more rock than the two Hamilton furnaces can run through."

MILLS AND FURNACES.

At the International mill the work is pushed with all dispatch. The building is nearly finished, and during the week they will put some of the machinery in place. Mr. TAGLIABUE is surveying the route for the wire tram-road to connect this with the Eberhardt and North Aurora mine. Stanford mill, in Eberhardt, is working with good results. Oasis and Sheba are running on Ward Beecher ore. Metropolitan has ore from Chloride Flat. Big Smoky is working, and at the same time preparing to change to dry crushing. Monte Christo is running successfully on Maryland Ore. The STETEFELDT furnace is working to a charm, and the whole mill is at last proving profitable. TREGLOAN'S mill is working on ore from the Original Hidden Treasure. POWERS' furnace has been running steadily, and shipped large quantities of base bullion. HAMILTON furnaces are both running on Jennie A ore. ROTHSCHILD works are closed, mainly to get a supply of ore and coal on hand.

In Pinto, an outside district, the Maryland mine ore is now worked at the Monte Christo mill, with good results. In Deep Creek important discoveries have lately been made. A good deal of work is being done in Robinson, although no furnaces are running. In Reveille, the mill has been stopped until the superintendent returns. A letter from Pioche, dated November 10th, says the Creole mine is now strongly fortified, and held by thirty armed men.

At Eureka, the *Sentinel*, November 19th, says: "Most of the furnaces are getting in winter suppiles. The teams are hauling ore to them as fast as possible. The Eureka Consolidated produced, in October, 222 tons bullion, worth $300 per ton. The two Buttercup furnaces produce six tons bullion per day. The JACKSON Co.'s furnaces produced in October 92½ tons bullion, worth $350 per ton. The separating works of OGDEN, DUNNE & Co. will be ready by December 1st. The product from the mines discovered within a month would alone keep several furnaces running."

British Columbia.

CARIBOO NEWS.

We have the *Sentinel* of the 15th ult. Snow had fallen on William creek, and the usual fall freshet, it was thought, would be "dispensed with" this season. The Spence Company, on Lightning creek, had struck a good prospect. On William creek the Cariboo Company washed up 202 ounces for the week, and the St. George Company 30 ounces. The Ballarat Company washed up 65 ounces for two days' run last week. The Cornish Company cleaned up over 50 ounces last Thursday week. From Stout, Conklin and Red gulches, and Valley Mountain, French, Lowhee and Mosquito creeks, the news is as good as ever. The winter prospects of the miners are considered good.

CARIBOO NEWS.

We have the *Sentinel* of the 15th ult. Snow had fallen on William creek, and the usual fall freshet, it was thought, would be "dispensed with" this season. The Spence Company, on Lightning creek, had struck a good prospect. On William creek the Cariboo Company washed up 202 ounces for the week, and the St. George Company 30 ounces. The Ballarat Company washed up 65 ounces for two days' run last week. The Cornish Company cleaned up over 50 ounces last Thursday week. From Stout, Conklin and Red gulches, and Valley Mountain, French, Lowhee and Mosquito creeks, the news is as good as ever. The winter prospects of the miners are considered good.

The late news from Germansen creek caused a good deal of excitement at Cariboo, and a number had started for the new diggings.

California

THE NORTH STAR MINE.

The gold mining company has issued its yearly report, from which we extract the following condensed statement:

RECEIPTS.

From bullion	$151,598 58
From skimmings, sulphurets, etc.	24,577 25
	$176,175 83
Liabilities	4,067 25
	$180,243 08

DISBURSEMENTS.

Mining labor	$66,197 67
Milling labor	17,149 37
Dead work	10,387 17
Mill supplies	25 853 42
Mine supplies	14,751 02
Liquidated debts	14,780 93
Dividends	6,000 00
Salaries, etc	5,295 25
Sundry accounts	17,839 27
Cash on hand	1,389 33
	$180,243 48

They produced 7,834 tons of ore, which yielded at the rate of $21 37 per ton. The expenses of mining, milling, etc., amounted to $16 73 per ton, leaving a profit of $4 64 per ton. They estimate the value of supplies on hand at the 6th of September at $18,295.

EXCHEQUER QUARTZ MILL.

A passing call at this mill (late DAVIDSON'S) yesterday afternoon, says the Alpine *Chronicle*, Nov. 26, gave us the pleasure of seeing the steam turned on for the first time since this valuable property passed into the hands of the Exchequer Company. The saw-mill portion of the establishment is now running, and we trust it will not be long ere the stamps will be clattering away and sending forth to the commercial marts of the world treasure from the "granite hills" of Silver Mountain. Manager CHALMERS is making important improvements, in order that the milling business of the company may be conducted economically and expeditiously, as well as comfortably. In the rear of the furnace, and contiguous thereto, a two-story building has been erected, and now nearly completed, in which the manager has a spacious office and chemical room on the second floor, the first or basement story being intended for the weighing, retorting and assaying departments. A room, to be connected with the assaying room, is to be built for the storage of charcoal. As the mine becomes developed, necessitating an increase of facilities for reducing the ores, additional batteries and barrels can be added without a heavy outlay of capital. This is an eight-stamp mill, with a furnace for roasting the ore. The amalgamating is carried on in six massive wooden barrels, agreeably with the FREIBERG process. The machinery is propelled by an engine of sufficient capacity to run the quartz and saw mills at the same time. We are confident this mill will in due time earn a name for Silver Mountain, as a silver-producing district, that others will envy.

AN IMPORTANT MINING ENTERPRISE.

The Jackson (Cal.) *Ledger*, of November 26th, thus speaks of a large and important mining project:

"But few of our readers or the public have an adequate idea of the extent and importance of this work, now near completion. With two or three notable exceptions, the canal is the largest in the State, being of the capacity of carrying five thousand inches of water, miner's measurement. The distance from the vicinity of Slabtown (where a tunnel seven hundred feet in length is being run, to Sutter creek, following the sinuosities of the canal to the hill on Tanner's ranch, in the rear of the Amador mine, is twenty-three miles, all of which will be completed in three or four weeks. A deep cut, one thousand feet in length and twenty feet deep is being rapidly finished by contract, on which some fifty men are employed. Much more rock was encountered than was anticipated and there has been miles of continuous blasting through solid rock. Nearly two thousand feet of the heavy iron pipe, thirty inches in diameter, is finished and ready for laying down. From Slabtown up the river, nearly two hundred men have been constantly employed. Many miles of rock-blasting has there been finished, the rock being a rather soft slate, and is more easily worked than in the granite formation."

Nebraska.

THE OMAHA COAL VEINS.

The Omaha *Herald*, November 22, says: "Veins of various dimensions were discovered within less than 'nine miles' of Omaha more than thirteen years ago, and the signs of the drifts which were made upon them are still visible in the limestone hill sides this side of Bellevue. When Dr. F. V. HAYDEN first came to Omaha, his attention was earnestly directed to the subject of Omaha coal, and, in company with associate geologists of recognized ability and repute, he reached the conclusion that no reliable workable coal veins could be found in this latitude. Surface veins have been found like this which is causing our Omaha and southwestern friends so much hope, and the greenhorns over the way to appear ridiculously, in various parts of the State, as every man knows who knows anything about it. But the fact stands that permanent workable coal mines have yet to be found in this vicinity; and it is our belief, based on the costly experience of the past and the best of scientific opinions, that they will not be, without going down beneath these surrounding limestone formations from five hundred to seven hundred feet, to where the real coal beds lie. We are over the dip of the coal measures which descend from Iowa underneath, to appear again where Dr. HAYDEN long since predicted they would appear, and where subsequent discovery verified his predictions. Of course, we hope that our opinions about Omaha coal veins will prove fallacious. Millions would be saved and gained to us if cheap coal could be added to our present advantages; but we do not expect it from 'seven-inch veins,' or any other veins which overlie the actual coal measures."

MARKET REVIEW.

The Coal Trade.

NEW YORK, Dec. 9, 1870.

WHOLESALE.—As we apprehended in our last issue, a strike has been inaugurated in the entire coal regions, consequant upon an attempt to reduce miners' wages to a scale corresponding with the decline in prices during the past two months. Forty-five cents per diamond car is the levy made. The men of the Pennsylvania Coal Company, Delaware, Lackawanna and Western R. R. Co., and Delaware and Hudson Canal Company were the first men to resolve to go out, and all stopped work on Saturday, 10th December. The Miners' Association has since this action resolved to order the entire region on a strike, which is also to take place on Saturday. Whether the men on the Lehigh, Wilkesbarre, Schuylkille, and Shamokin regions will obey this mandate, remains to be seen. Many of the dealers are under the impression that the Wilkesbarre men will refuse to join the strike, as they went to work on the basis mutually agreed upon, and have been treated in the best manner by the operators in that district. Should this be the case, why of course the Wilkesbarre Coal and Iron Company and others with their superior facilities for furnishing coal, will supply the market at advanced prices. What that advance will be, it is hard to conjecture. The prices ranging in the market now are about those asked last month, or before the last sale. Some claim that there has been an advance on all sizes of about 50c. per ton, but we fail to find any sales at such figures. That in consequence of the strike prices are firmer and a more speculative feeling prevails, there is no doubt. We do not think there is any necessity for anybody to become frightened, just yet. We believe there is enough coal stocked at out-of-the-way places by the different large companies to supply all, and a small advance will bring it on sale. It may be at about the prices ruling in October.

This journal has always advocated keeping prices at moderate figures, believing it best for all parties concerned. The facilities for producing coal are immense, as everybody knows; therefore, to keep all hands employed, the prices must be kept at figures that will enable the poor classes to use it freely. It is contemplated that this strike, if general, will last from six weeks to two months; by this time the surplus will have been sufficiently reduced, and, in consequence thereof, the prices advanced to a rate that will enable operators to pay November rates to miners, which, in all probability, would be accepted, and labor resumed. These remarks are, at best, to be taken with caution. No one can tell what complications this strike may lead to. We notified our readers of its coming, and will advise them during its continuance, entirely with a view to their advantage. We think those dealers who have not coal enough on hand to last them six weeks, had better buy at prices ruling next week, as an attempt will certainly be made to advance prices from week to week, as the strike progresses. We do not consider it necessary to change any of our quotations this week, in consequence of the unsettled state of affairs. We give, however, the following quotations of the Wilkesbarre Coal and Iron Company, which are only good for to-day, or until accepted by the company: Lump, $4 75; steamer, $4 75; broken, $5; egg, $5; stove, $5 75; chestnut, $4 50. This is an advance of 75c. on lump, 50c. on steamer and broken, 35c. on egg, 50c. on stove and chestnut, on November prices, on board at Hoboken.

The following are the prices of the Old Company Lehigh, on the same conditions: Lump, $5 50; broken, $5; egg, $5; stove, $5 75; chestnut, $4 50. Which is an advance of 25c. on lump, stove and chestnut over November quotations, on board at Port Johnston.

ITEMS.

A report of a lease by the Scranton Company of the Lehigh Coal and Navigation Company's works is unfounded.

The want of water in the Delaware and Hudson Canal has interfered with the shipments of that company, and Mill Creek, Pine Ridge, and even the Baltimore mines, have been idle part of the time.

On the Plank road, Mr. SWOYER is putting down a new shaft, intending to reach the large vein. The opening is close to the breaker, the engine of which has been doing the hoisting. It is designed to commence mining next month, and an old locomotive has been brought from the Pleasant Valley shaft, and will be used at the new shaft.

It is thought that coal is near the workmen of the "Conyngham" shaft, of the Delaware and Hudson Company, above town.

The slope of the Baltimore mine has just gone through a roll or fault, and has less pitch or inclination. Not far below, the surface caved in letting down some side tracks of the Nanticoke Railroad above the Coal Brook crossing, showing a bad roof, and giving an impression that the old Still House mine is the *Baltimore* and not an upper vein, which would disappoint the contractor at the new shaft, who has set his eye on 800 or 1,000 feet at least.

In Plymouth some of the veins exhibited unexpected changes in dividing, uniting and overaliding, and we are not sure that they are all right even now. So in Hanover, veins appeared and disappeared to suit any fancy but the operator's. Between Carbondale and Scranton there has been much disappointment and loss in opening mine and this part of the region, with larger and better veins, seems to be subject to the same want of regularity, which defies calculation.

If the great Baltimore vein approaches the surface in the valley near the new shaft, the veins that lie above it in other places must have been swept away, and there is just so much less coal for coming generations, and so much stronger argument for economy in mining. If they are still above it in that place, as the shaft must soon prove, what a waste it will be to have them lost by improper mining, which must be the case if coal will not sell for enough to pay for mining and cleaning. Low-priced coal is not cheap coal in the long run. —*Record of the Times.*

Many of our readers who have been customers of the Pennsylvania Coal Company will no doubt recollect Mr. A. S. SWORDS, for twelve years the courteous salesman there. He has now associated himself with Mr. C. A. BLAKE and F. S. HOYT, under the firm of C. A. BLAKE & Co., room 6, 111 Broadway, where he is offering New England Red Ash, Wilkesbarre, Pittston and Lehigh Coals, at low figures. Orders committed to this new and enterprising young firm will, we are satisfied, be satisfactorily attended to and promptly filled. No concern has better facilities in the market.

Anthracite Coal Trade for 1869 and 1870.

The following table exhibits the quantity of Anthracite Coal passing over the following routes of transportation for the week ending Dec. 3, 1870, compared with week ending Dec. 4, 1869.

COMPANIES.	1869. WEEK.	1869. TOTAL.	1870. WEEK.	1870. TOTAL.
*Phila & Reading R.R. †	76,515	3,393,328	70,124	2,934,263
†Schuylkill Canal	29,447	675,764	28,654	542,466
†Lehigh Valley R. R.	...	2,015,296	28,395	2,810,022
Lehigh & Sus. R. R.	32,852	854,774	30,590	984,124
Lehigh Canal	6,309	604,122	21,447	781,491
Scranton North	13,112	412,804	9,486	661,263
" " South	35,064	98[illegible],524	35,590	1,673,801
Penn. Coal Co., rail	22,629	891,139	17,907	1,064,089
" " " canal	239	18,50[illegible]	....	16,602
Del. & Hud. Canal Co.	43,215	1,205,764	....	1,292,175
" " R. R.	7,658	14[illegible],333	14,446	491,623
" " " south	2,672	119,265	3,072	413,696
By Jefferson R. R.	....	....	3,505	214,268
Shamokin	11,548	442,118	10,784	456,375
Trevorton	8,234	34,561	....	147,371
Lykens Valley Coal Co.	2,378	7[illegible],054	1,510	156,360
Wyoming South	....	329,650	....	3[illegible],645
Wyoming North	....	76,308	....	....
P. N. Y. C. & R. R. Co.	....	....	3,175	275,151
Williamstown, Col'y.	....	195,[illegible]83	....	277,319
Short Mountain	2,434	102,235	....	....
Big Lick Colliery	....	....	....	....
Total	303,743	12,563,378	279,682	15,288,422
1869	279,681			12,563,378
Increase week and year.	24,061			2,725,044

* Less coal transported for Company's use and Bituminous coal

† These figures are for the week and fiscal year, ending November 30. See table below for tonnage since Dec. 1st.

Bituminous Coal Trade, 1869 and 1870.

The following table exhibits the quantity of Bituminous Coal passing over the following routes of Transportation for the week ending Dec. 3, 1870, compared with week ending Dec. 4, 1869.

COMPANIES.	1869. Week.	1869. Year.	1870. Week.	1870. Year.
B. & O. R. R.	....	....	27,866	968,078
C. & O. Canal	....	....	10,401	594,403
H. & B. T. R. R.	8,145	336,476	6,068	287,475
Harrisburg & D.	11,834	....	....	276,560
L. V. R. R.	....	21,237	....	13,847
P. & N.Y. C. & R. Co.	....	....	4,671	239,660

Philadelphia and Reading R. R.

Amount of coal transported on the Philadelphia and Reading Railroad for the five days ending Wednesday, Nov. 30, 1870:

From St. Clair	28,511 02
" Port Carbon	3,036 10
" Pottsville	3,813 18
" Schuylkill Haven	18,200 09
" Auburn	6,155 14
" Port Clinton	10,180 19
" Allentown and Alburtis	205 15
" Harrisburgh and Dauphin	7,755 18
Total paying freight	77,880 05
Coal for Company's use	3,372 17
Total for week	81,253 02
Previously this year	3,676,471 18
Total	3,757,725 00
To same time last year	4,239,456 18

Amount of coal transported on the Philadelphia and Reading Railroad, Thursday, Dec. 1, 1870;

From St Clair	1,891 02
" Port Carbon	381 02
" Pottsville	6[illegible]3 17
" Schuylkill Haven	811 07
" Auburn	1,294 16
" Port Clinton	1,167 01
" Allentown and Alburtis,	2[illegible]5 05
" Harrisburg and Dauphin	1,240 01
Total paying freight	7,487 11
Coal for Company's use	168 08
Total for day	7,655 19

Schuylkill Canal.

Report of coal transported over the Schuylkill Canal for the week ending Thursday, December 1, 1870.

	Tons. Cwt.
From Port Carbon	— —
" Pottsville	— —
" Schuylkill Haven	28,278 00
" Port Clinton	1,376 00
Total for week	29,654 00
Previously this year	542,812 15
Total	572,466 15
To same time last year	675,764 12

Harrisburgh and Dauphin Coal Trade.

The following is the amount of Bituminous Coal transported via the P. and R. R. for the week ending Nov. 30, 1870:

	Tons.
For week	7,775 18
Previously this year	680,791 12
Total	688,547 10
Same week last year	11,834 19
For Thursday, Dec. 1	1,290 01
Previously	.....
Total for year beginning Dec. 1	1,290 01
Same date last year	3,797 11

Delaware, Lackawanna, and Western Railroad.

COAL Transported for the week ending Saturday, December 3, 1870.

	WEEK. tons. cwt.	YEAR. tons. cwt.
Shipped North	9,488 04	664,283 17
Shipped South	35,588 04	1,673,401 00
Total	45,076 08	2,337,684 17
For the corresponding time last year,		
Shipped North	13,112 19	412,804 11
Shipped South	35,064 18	986,324 15
Total	48,177 17	1,399,128 06
Increase	.....	.....
Decrease	3,101 09	938,755 11

Report of Coal Transported over Lehigh Valley Railroad

Three days ending November 30, 1870, and previously this season, compared with same time last year:

WHERE SHIPPED FROM.	WEEK. Tons. Cwt.	PREV'LY. Tons. Cwt.	TOTAL. Tons. Cwt.
WYOMING REGION.			
For Rail	6,670 01	581,926 03	588,596 04
" Canal	.....	.....	.....
Total	6,670 01	581,926 03	588,594 04
Same time last year	.....	450,364 13	450,364 13
Increase	6,670 01	131,561 10	138,231 11
Decrease	.....	.....	.....
HAZLETON REGION.			
For Rail	15,673 18	1,690,585 16	1,706,259 14
" Canal	5,487 01	295,280 04	300,767 05
Total	21,160 19	1,985,866 0[illegible]	2,007,026 19
Same time last year	.....	913,623 01	913,623 01
Increase	21,160 19	1,072,242 19	1,093,403 19
Decrease	.....	.....	.....
UP. LEHIGH REGION.			
For Rail	68 17	11,933 07	12,002 04
" Canal	.....	.....	.....
Total	68 17	11,933 07	12,002 04
Same time last year	68 87	8,581 11	8,581 11
Increase	.....	3,351 16	3,420 13
Decrease	.....	.....	.....
B. M. REGION.			
For Rail	5,326 16	556,207 18	561,534 14
" Canal	1,853 07	140,245 09	142,098 16
Total	7,180 03	696,453 07	703,633 10
Same time last year	7,180 03	504,786 06	504,786 06
Increase	.....	191,667 01	198,847 04
Decrease	.....	.....	.....
MAHANOY REGION.			
For Rail	5,413 15	286,734 00	292,147 15
" Canal	193 01	2,822 19	3,016 00
Total	5,606 16	289,568 19	295,163 15
Same time last year	5,606 16	431,987 14	431,987 14
Increase	.....	.....	.....
Decrease	.....	142,430 15	136,823 19
M. C. REGION.			
For Rail	11 07	2,152 14	2,164 01
" Canal	.....	.....	.....
Total	11 07	2,152 14	2,164 01
Same time last year	.....	827 05	827 03
Increase	11 07	1,325 14	1,336 18
Decrease	.....	.....	.....
Total Wyoming	6,670 01	581,926 03	588,596 04
" Hazleton	21,160 19	1,985,866 0[illegible]	2,007,026 19
" Upper Lehigh	68 17	11,933 07	12,002 04
" Beaver Meadow	7,180 03	696,45[illegible] 07	703,633 10
" Mahanoy	5,606 16	289,56[illegible] 19	295,[illegible]15
" Mauch Chunk	11 07	2,152 14	2,164 01
Total Anthracite	40,696 03	3,567,888 10	3,608,586 13
Bituminous Coal recv'd from Cata. R. R.	.....	.....	.....
N. C. R. R.	.....	.....	.....
E. P. R. R.	.....	13,847 00	13,847 00
P. & N.Y. C. & R.R. Co	.....	.....	.....
Fall Creek	.....	.....	.....
Schroeder	.....	.....	.....
Towanda	.....	.....	.....
Total by rail and canal	40,638 03	3,581,735 10	3,622,433 13
Same time last year	.....	2,331,407 08	2,331,407 08
Increase	40,098 03	1,250,328 02	1,291,026 05
Decrease	.....	.....	.....
Forwarded East from M'h Chunk by rail	28,395 02	2,781,625 05	2,810,020 07
Same time last year	.....	2,015,296 11	2,015,296 11
Increase	28,395 02	766,328 14	794,723 16
Decrease	.....	.....	.....

RECAPITULATION.

Forwarded East from M'h Chunk by rail	28,395 02	2,781,625 05	2,810 020 07
To N. C. R. R., at Mount Carmel	.....	3,423 15	3,423 15
Forwarded North from L. & B. Junction	3,731 08	272,420 03	276,151 11
To L. & S. R. R. at Packerton for rail	90 10	8,295 13	8,385 03
Delivered at M'h Chunk	221 11	1,650 13	1,650 13
Delivered on line of road above Mauch Chunk	726 03	11,116 05	11,337 16
Delivered above M. Chunk for use of L. V. R. R.	5,487 01	51,008 04	51,734 07
To L. & S. R. R., at P'n Hav., for railroad	5,487 01	295,280 04	300,767 05
Do. for canal	2,906 08	143,068 08	145,114 16
At M.Chunk for canal	.....	.....	.....
Total Anthracite	40,638 03	3,567,888 10	3,6[illegible]8,586 13
Bituminous Coal	.....	13,847 00	13,847 00
Total all kinds	40,698 03	3,581,735 10	3,622,433 13

Penn. and N. Y. Canal and Railroad Co.

REPORT of Coal Transported via. the Pennsylvania and New York Canal and Railroad Company, for week ending Dec. 6, 1870:

	WEEK.	PREVIOUSLY.	TOTAL.
Anthracite	3,175 00	272,976 09	276,151 11
Bituminous	4,671 00	237,429 00	239,660 00
Total, Ant. and Bit.	7,846 00	510,396 09	515,811 11

Report of Coal Transported by the Lehigh Coal and Nav. Co.'s Railroads and Canals,

Week ending December 3, 1870—Compared with same time last year.

WHERE SHIPPED FROM	WEEK, 1870. tons cwt.	WEEK, 1869. tons cwt.	YEAR 1870. tons cwt.	YEAR, 1869. tons cwt.
Wyoming Region	26789 12	26152 15	1105667 00	775743 12
Upper Lehigh Region	3[illegible]2 15	43 05	14[illegible]6 10	77856 08
Mahanoy Region	3[illegible] 16	81 12	30[illegible] 05	2705 07
Hazleton Region	9107 09	177 04	314.99 03	122656 04
Beaver Meadow Region	3051 07	1[illegible]22 16	144940 15	97646 08
Mauch Chunk Region	12.69 16	1[illegible]86 05	2[illegible]3 09	4.86.6 02
Totals	54[illegible]2 15	38963 17	1997776 00	1494746 01
Increase	14[illegible]8 16		503029 19	
Decrease				
DISTRIBUTION.				
Forwarded East of Mch Chunk by Rail	30590 04	32872 07	989124 16	834179 09
Forwarded East of Mch Chunk by Canal	21444 05	6309 14	791491 17	604122 19
Delivered at and above Mauch Chunk	1069 12	608 11	42897 15	32867 15
Delivered to L. & B. R. R. at Plymouth Bridge	1788 15	173 05	184261 12	18424 15
L. V. R. R. at Sugar N.				5151 03
Totals	54892 15	38963 17	1997776 00	1494746 01
Of the above there was transported on acc'nt of L. C. & N. Co.	14627 12	12921 13	274937 15	449197 02
W.-B. C. & I. Co.	17800 04	11556 16	5[illegible]729 09	3[illegible]3069 13
Totals	32477 16	24478 09	8[illegible]667 04	8[illegible]266 15
Increase	7999 07		2[illegible]400 09	
Decrease				

Shipments of Cumberland Coal

for the week ending Saturday, November 26, and for the year 1870:

SHIPPED BY	B. & O. R. R.	C. & O. CANAL.	TOTAL.
Cooke M.	55 00	.....	55 00
Borden	3,333 02	.....	3,333 02
Consolidation	6,339 09	806 10	7,145 19
Spruce Hill	516 02	.....	516 02
Midlothian	521 09	1,253 02	1,774 11
H. and Baltimore	124 12	1,704 18	1,820 10
do Va M	1,396 10	.....	1,396 10
V C & I Co.	1,124 11	.....	1 124 11
G. C. C. and I.	879 19	772 10	1,652 09
Big Vein	1 843 04	.....	1,843 04
Maryland	2,210 01	4 506 04	6,716 05
American	1 505 19	1,358 06	2,864 05
Atlantic	1,132 05	.....	1,132 05
Piedmont	1 677 05	.....	1,677 05
Swanton	959 13	.....	959 13
Barton	708 00	.....	708 00
Potomac	1,485 15	.....	1,485 15
George's Creek M. C.	436 17	.....	436 17
Franklin	1,617 00	.....	1,617 00
Total week	27,866 13	10,401 10	38,268 03
Previous	940,211 09	[illegible]84,002 [illegible]4	1,524,213 13
Total year	968,07802	594,403 14	1,562,481 16

Pennsylvania Coal Company,

Shipments of Pittston Coal for the week ending Dec. 3, 1870.

	1870. WEEK.	1870. YEAR	1869. WEEK.	1869. YEAR.
By Railway	17,907 03	1,064,089 15	22,263 04	891,139 00
" Canal	.....	16,632 18	239 13	18,706 18
Total	17,907 03	1,080,692 13	22,263 17	909,845 18

Increase, 1870, 170,846 15 tons.

Delaware and Hudson Canal Company.

Coal mined and forwarded by the Delaware and Hudson Canal Company, for week ending Saturday, December 3, 1870.

	WEEK.	SEASON.
North	28,408 19	1,929 100 17
South	3,072 13	413,096 12
Total	31,481 12	2,342,797 00
CORRESPONDING TIME IN 1869:		
North	46,763 11	1,299,779 11
South	2,671 19	117,548 18
Total	45,435 10	1,411,328 09
Decrease North	18,354 12	Inc. 635 321 06
Increase South	409 14	Inc. 296,147 14
Total Increase	17,933 18	Inc. 931,469 00

The following is a statement of coal transported by the Delaware and Hudson Canal Company, for the week ending December 3, 1870.

	WEEK.	SEASON.
By Del. and Hud. Canal		1,292 675 00
By Railroad	14,446 00	491,623 00
South	3,072 00	413,696 00
Total	17,518 00	2,197,994 00
By Jefferson R.R.	3,505 00	1[illegible],268 00
Corresponding time in 1869	21,023 00	2,212,262 00
By Del. and Hud. Canal	43,215 00	1,[illegible]05,764 00
By Railroad	7,668 00	149 363 00
South	2,672 00	119 2[illegible]5 00
Total	53,555 00	1,474,392 00
Increase	137,870 00	

Prices of Coal by the Cargo.

[CORRECTED WEEKLY.]

SCHUYLKILL.	AT NEW YORK, December 10. R. A.	AT NEW YORK, December 10. W. A.	AT PHILADELPHIA, December 9. R. A.	AT PHILADELPHIA, December 9. W. A.
Lump	$—	$5 00	4 75	4 50
Steamer	— —	5 00	— —	4 50
Broken	— —	5 50	— —	4 50 to 4 75
Egg	5 50 to 6 00	5 00 to 5 25	— —	4 50 to 4 75
Stove	5 50 to 6 00	5 25 5 50	— —	4 50 to 4 75
Chestnut	4 00 to 4 50	4 00 4 25	— —	4 25 to — —
Pea	— —	— —	— —	— —
LEHIGH.				
Lump, (along side)	5 25	— —	— —	— —
Broken	5 10	— —	— —	— —
Egg	5 10	— —	— —	— —
Stove	5 60	— —	— —	— —
Chestnut	4 25	— —	— —	— —
Pea	— —	— —	— —	— —
SPECIAL COALS.*				
Diamond Vein	R. A.	6 00	— —	— —
New England	"	— —	— —	— —
Locust Dale	W. A.	5 50	— —	— —
Honey Brook, Leh	W. A.	4 00 to 5 00	— —	— —
Spring Mountain	" "	4 00 to 5 00	— —	— —
Sugar Creek	" "	4 00 to 5 00	— —	— —
Sugar Loaf	" "	4 00 to 5 00	— —	— —
Old Comp'y's	" "	4 00 to 5 00	— —	— —
Cross Creek	" "	4 00 to 5 00	— —	— —
Room Run	" "	— —	— —	— —
Girardville	" "	— —	— —	4 75
McMichael	" "	— —	— —	4 75
Shamokin	" "	5 50	5 25	— —
Lykens Valley	" "	— —	5 75	— —
Broad Top	" "	5 50	— —	— —
Hill & Harris	" "	— —	4 75	— —
Henry Clay	" "	— —	5 00	— —
Powelton	" "	5 50	— —	4 75

[*Dealers in these coals may be found in our advertising columns.]

Prices for Coal at Mauch Chunk.

December 1870.

	F.L.	Bro.	Gra.	Eg.	Sto.	Chest.
Lehigh	$3 00	$3 75	$3 75	$3 75	$4 00	$3 00
Wilkesbarre	3 00	3 75	3 75	3 75	4 00	3 00

For freight to Elizabethport and to New York see "Freights."

BITUMINOUS COALS.

Kittaning Coal Co.'s Phœnix Vein	f.o.b. at Phila.	$5 00
" Lemon	" "	4 75
Cumberland Vein Coal	" "	4 75
Consolidation Coal Co.'s on board	N. Y.	7 00
Maryland Coal Co.	"	7 00

Company Coals.

December, 1870.

	L.	Str.	Gra.	Eg.	Sto.	Ches.
Scranton at E. Port	4 25	4 25	4 50	4 50	5 25	4 25
Pittston at Weehawken	— —	— —	— —	— —	— —	— —
Lackawana at do	4 25	4 50	4 40	4 50	4 80	4 10
Wilk'b're at Hoboken	— —	— —	— —	— —	— —	— —
Old Co. Lehigh at Pt. Johnston	5 15	4 65	4 65	5 15	4 15	— —
Lehigh at E., Port	— —	— —	— —	— —	— —	— —

For freights to different points, see "Freights."

Prices at Baltimore—December, 1870.

Wholesale Prices to Trade.

Wilkesbarre, by cargo or car load	$4 80@—
Pittston and Plymouth, do	5 60@5 75
Shamokin Red or White Ash, do	— —@5 00
Lykens Valley Red Ash, do	5 25@— —
Zerba Valley	5 25@— —
Treverton	6 00@— —
By retail, all kinds per ton of 2240 lbs	7 25@8 25
Georges Creek & Cumberland f. o. b. at Locust Point for cargoes	4 60@4 75
Fairmont and Clarksburg f.o.b. at L. Point	6 00@6 50

Prices at Georget'n, D.C., & Alexandria, Va.

December, 1870.

George's Creek and Cumberland f. o. b. for shipping..$4 40

Prices at Havre de Grace, Md.

Wilkesbarre and other White Ash for cargoes	$— —@5 50
Lykens Valley	— —@6 25
Shamokin Red or White Ash	— —@5 75
Trevorton and Zerba Valley	— —@6 00

Prices of Gas Coals.

December, 1870.

PROVINCIAL.

Corrected weekly by Louis J. Belloni, Jr. 41-43 Pine st., N.Y.

	Duty, $1 25, gold. Coarse.	Slack.
Block House	$1 75	@— 75
Gowrie	1 75	@— 75

Corrected by Bird, Perkins & Job, 86 South street.

	Coarse.	Culm of Coal.
Pictou	$2 25	@1 25
Sydney	2 25	@— 80
Lingan	1 75	@— 80
Little Glace Bay	1 75	@1 00
Caledonia	1 60	@— 80

A discount from the prices of the coarse Coal on purchase of 5000 tons and upwards. Duty $1 25 per ton, gold, on the coarse coal. 25 per cent. ad valorem on the Culm of Coal.

AMERICAN.

	Currency.
Westmoreland	7 75 @8 00
Fairmount Gas Coal Co. of N. Y.	7 50 @— —
Despard Coal Co.	$7 50 @— —
Penn.	7 75 @8 00
Newburg Orrel Gas	— — @— —
West Fairmount Gs Coal	8 00 @— —
AT PHILADELPHIA.	
Powelton	$7 50

Prices of Foreign Coals.

December, 1870.

Duty $1 25 per ton.

Corrected weekly by PARMELE BROS., No 32 Pine street New York.

Liverpool Gas Caking	$ 9 00@— —
" " Cannel	11 50@12 50
" House	— —@16 00
" Orrel	12 00@14 00

Per ton 2,240 lbs., ex-ship.

PRICES FROM YARD.

Liverpool House Orrel, screened	$16 00@17 50
" " Cannel, "	18 00@20 00

Per ton 2,000 lbs, delivered

Rates of Transportation to Tide Water.

BY RAILROAD.

TO PORT RICHMOND, PHILADELPHIA.

Philadelphia and Reading Railroad, from Port Carbon	$2 00

Less drawback of 50 cents on all Coal shipped east of New Brunswick and south of Cape Henry.

MAUCH CHUNK TO ELIZABETHPORT.

L. V. Railroad from Mauch Chunk to Easton	$ 76
C. R. R., N. J., Easton to Elizabethport	1 08
Shipping expenses at Elizabethport	25
Wharfage	10
Total	$2 1

MAUCH CHUNK TO PORT JOHNSON.

L. V. R. R., or L. & S. R. R. from M. C. to Easton	$ 76
C. R. R., of N. J., Easton to Pt. Johnson	1 11
Shipping expenses	25
Warfage	10
Total	$2 23

TO HOBOKEN.

L. V. R. R., Mauch Chunk to Easton	$ 76
Morris & Essex R. R. Easton to Hoboken	1 11
Shipping expenses	25
Warfage	10
Total	$2 23

TO SOUTH AMBOY.

L. V. R. R.	76
B. & D. R. R. / Cam. & Am. R. R.	1 02
Shipping Expenses,	25
Total	$2 03

PENN HAVEN TO ELIZABETHPORT.

L. V. RR. Penn Haven to Easton	76
C. RR. of N. J. Easton to Elizabethport	1 09
Shipping expenses	25
Wharfage	10
Total	$2 19

BY CANAL.

Via Schuylkill Canal.

TO PHILADELPHIA.

From Schuylkill Haven	$1 15
" Port Carbon	1 18
" Port Clinton	1 08

TO NEW YORK.

From Schuylkill Haven	$1 75

Via Lehigh Canal.

TO PHILADELPHIA.

Lehigh Canal	$0 70
Freight and towage	1 07
Total	$1 77

TO NEW YORK.

Lehigh Canal	$ 40
Morris " Freight / Towing	2 10
Total	$ 2,50

TO JERSEY CITY.

Lehigh Canal	$ 40
Morris " Freight	2 05
	2 45
For re-shipment	2 19

Via Delaware and Raritan Canal.

TO NEW YORK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1,25
Towage	20

TO NEW BRUNSWICK.

Lehigh Canal	$ 40
Delaware Division Canal	30
Delaware and Raritan Canal	35
Freight	1 05
Total	$ 2,10

For Re-shipment—30 extra for shipping, less 10 cents. drawback.

Freights.—DECEMBER, 1870.

TO EASTERN PORTS.	From Philada.	From E. Port and Port Johnston.	From Newburg....	From Rondout....
Amesbury	$2 50	$2 00	$	$
Bangor	2 30	1 60	1 60	
Bath	2 30	1 75	—	
Boston	2 50	1 85	2 25	1 90
Bridgeport	1 75	1 00	1 10	1 20
Bristol	2 00	1 40	1 40	
Cambridgeport	2 75	2 00		
Derby	2 00	1 20		
Dighton	2 30	—	1 45	
East Cambridge	2 35	2 00		
Fall River	2 50	1 40	1 40	
Hackensack	1 75	1 00		
Hartford	2 50	1 50		
Jersey City	1 40	60		
Middletown	2 25	1 25		
Mystic	—	1 25	1 30	
New Bedford	2 00	1 40		
Newburyport	2 65	1 85		
New Haven	1 90	1 00	1 10	1 20
New London	1 75	1 25	1 25	1 30
Newport	2 00	1 40	1 40	
New York	1 35	60	70	
Norwalk	1 80	1 00	1 05	
Norwich	2 00	1 30	1 35	1 40
Pawtucket	2 30	1 50	1 60	
Portland	2 30	1 50		
Portsmouth, N. H.	1 45	1 85		1 85
Providence	2 00	1 40	1 45	1 45
Rockport	2 10	1 65		
Saco	2 25	1 75		
Sag Harbor	1 70	1 20	1 30	
Salem	2 35	1 65	2 25	23
Stamford	2 00	1 00	1 00	
Stonington	2 00	1 30	1 25	
Taunton	2 30	1 75		
Warren	—	1 40	1 45	
Washington	1 25			
TO RIVER PORTS.				
Albany		90	60	
Catskill		—	50	
Cocksackie		—	50	
Coeyman's		—	75	
Cold Spring		—	35	
Fishkill		—	30	
Haverstraw		50	60	
Hudson		—	50	
New York		—	70	
Nyack		60	60	
Poughkeepsie		—	35	
Rhinebeck		—	30	
Rondout		—	—	
Saugerties		—	40	
Sing Sing		—	75	
Stuyvesant		—	55	
Tarrytown		80	75	
Troy		90	75	
West Point		—	35	
Yonkers		40	60	

Foreign and Provincial Freights.

December, 1870.

Foreign.	
Newcastle and Ports on Tyne, per keel of 21 1-5 tons	£14 00@£16 00
Liverpool, 5 per cent primage	13s @16. ton
TO NEW YORK.	
Provincial	
Sidney	$3 00
Lingan	3 00
Cow Bay	—
Port Caledonia	3 25
Little Glace Bay	3 00
TO BOSTON.	
Sydney	$2 70
Lingan	2 70
Cow Bay	—
Port Caledonia	3 00
Little Glace Bay	2 75

Towing Rates.

TO EASTERN PORTS.

	Per Ton.
To New Haven,	$ 40
Bridgeport,	40
Southport,	40
Westport,	40
Norwalk,	40
Stamford,	40
	Per Boat.
Greenwich,	$70 00
Port Chester,	80 00
Mamaroneck,	70 00
Glen Cove,	60 00
New Rochelle,	55 00
East Chester,	60 00
West Chester,	30 00
White Stone,	30 00
College Point,	25 00
West Farms,	25 00
Flushing,	30 00
Harlem and Mott Haven,	20 00
Port Morris,	20 00
Ninety-first street and Astoria,	15 00

Boats beyond Port Chester, with less than 200 tons, $80 per Boat.

TO RIVER PORTS.

Boats of 150–250 Tons.	Per Ton.
To Manhattanville,	8 cents
Spuyten Duyvil,	8 "
Yonkers,	9 "
Hastings,	10 "
Piermont,	12 "
Dobbs' Ferry,	12 "
Nyack,	14 "
Tarrytown,	15 "
Sing Sing,	16 "
Croton Landing,	17 "
Haverstraw,	17 "
Verplanck's,	17 "
Peekskill,	18 "
West Point,	20 "
Cold Spring,	20 "
Newburgh,	18 "
Poughkeepsie,	22 "
Rondout,	23 "
Boats of 100 Tons.	Per Boat
To Manhattanville, and Return,	$11 00
Spuyten Duyvil, "	13 00
Yonkers, "	15 00
Sing Sing, "	20 00
Peekskill, "	25 00

METALS.

NEW YORK, December 9, 1870.

IRON.—Duty: Bars, 1 to 1½ cents ℔ lb; Railroad, 70 cents ℔ 100 lbs.; Boiler and Plate, 1½ cents ℔ lb; Sheet, Band, Hoop, and Scroll, 1¼ to 1¾ cents ℔ lb; Pig, 9 ℔ ton; Polished Sheet, 3 cents ℔ lb.

	Store Prices.
Pig, Scotch No. 1, ℔ ton	34 00@36 00
Pig, American, No. 1	— —@31 00
Pig, American, No. 2	— —@30 00
Pig, American, Forge	27 00@29 00
Bar, Refined, English and American	— —@75 00
Bar, Swedes, assorted sizes (gold)	85 00@100 00

	Store Prices, Cash.
Bar, Swedes, ord'y sizes, less 5 ℔ ct.	— —@110 00
Bar, Refined " "	77 50@ 82 50
Bar, Common " "	72 50@ 75 00
Scroll " "	97 50@125 —
Ovals and half-round " "	97 50@125 —
Band " "	95 —@ — —
Horse Shoe " "	95 —@ — —
Rods, ⅜ to ⅝-16 inch " "	82 50@ — —
Hoop " "	102 50@140 00
Nail rod, less 5 ℔ ct.	6¼—@ — —
Sheet, Russia, as to Nos. (gold)	10¾@—11¾
Sheet, Single, D, and T. Common	—4¾@— 6
Sheet, Galv'd, Nos. 14 to 26 10 and 12c. Nos. 27, 28, and 29, 13@14	
Rails, English (gold), ℔ ton	57 00 @59 00
Rails, American, at Works in Pa.	70 00 @71 00

STEEL.—Duty: Bars and ingots, valued at 7 cents ℔ ℔ or under, 2½ cents; over 7 cents and not above 11, 3 cents ℔ lb; over 11 cents, 2½ cents ℔ lb, and 10 ℔ cent ad val. (Store prices.)

English Cast (2d and 1st quality) ℔ lb	— 15 @— 18
English Spring (2d and 1st quality)	— 7 @— 10
English Blister (2d and 1st quality)	— 10 @— 17
English Machinery	— 11½@— 14
English German (2d and 1st quality)	— 13 @— 15
American Blister "Black Diamond"	— — @— 12
American, Cast, Tool do.	— — @— 17
American, Spring, do.	— 9 @— 11
American Machinery, do.	— — @— 12
American German, do.	— 9 @— 12

COPPER.—Duty: Pig, Bar, and Ingot, 5; old Copper 20 cents ℔ lb; Manufactured, 45 per cent. ad val.

	All Cash.
Copper, New Sheathing, ℔ lb	— @— 30
Copper Bolts	— @— 32
Copper Braziers, 16oz. and over	— @— 32
Copper Nails	— @— 37
Copper, Old Sheathing, &c., clean	19 @— 20
Copper, Chili Pig	— @— —
Copper, American Ingot	22¼@— 22—
Yellow Metal, New Sheating	— @— 22
Yellow Metal Bolts	24 @— —
Yellow Metal Nails	— @— 22

LEAD.—Duty: Pig, $2 ℔ 100 lbs.; old Lead, 1½ cents ℔ lb: Pipe and Sheet, 2½ cents ℔ lb.

Galena, ℔ 100 lbs.	$— @— —
Spanish (gold)	6 30 @6 37½
German, do.	6 30 @6 37½
English, do.	6 30 @6 62½
Bar (net)	7 50 @— —
Pipe (net)	7 50 @— —
Sheet	8 00 @— —

TIN.—Duty: Pig, Bars, and Blocks, 15 ℔ cent. ad val.; Plate and Sheets and Terne Plates, 25 ℔ cent. ad val.

	Gold ℔ lb.
Banca	36½@37
Straits	32½@33
English	— @32

PLATES.

Fair to Good Brands.	Gold.	Currency.
I. C. Charcoal, ℔ box	$8 25 @8 50	$9 25 @9 75
I. C. Coke	7 25 @8 —	8 50 @ 9 00
Coke Terne	5 75 @6 75	7 00 @ 7 25
Charcoal Terne	7 25 @7 75	8 50 @ 9 00

SPELTER.—Duty: In Pigs, Bars, and Plates, $1 50 ℔ 100 lb

	Gold.
Plates, Foreign ℔ 100 lbs.	$6 00 @ 6 12½
Plates, Domestic ℔ lb.	8½@— 11½

REMARKS.

COPPER.—The manufacturers' combination have made no change in prices recently, and manufactured goods are steady at our quoted rates. Ingot is not active, but there is a fair demand at steady and firm prices; sales have been made of 150,000 lb. Lake at 22½c.; 75,000 lb. for delivery January 20, 22½c.; 100,000 lb. Detroit, for January delivery, 22¾ @ 22¾c.; and 150,000 lb. Lake, on private terms. Baltimore is quiet at 22½c. The production of the Lake Superior mines the present year is estimated at twenty-three millions of pounds, and all others six millions of pounds.

IRON.—The demand for Scotch Pig has been more moderate, and the bulk of the receipts are being placed in bond; quotations, however, are without quotable change; we have only to notice a sale of 350 tons Eglinton and Glengarnock, to arrive, on private terms. There has been no improvement in the demand for American, but holders are unwilling to make any further concessions; we quote nominally $31 for No. 1, and $30 for No. 2. New Rails are in moderate demand at former rates; old meet with very little inquiry, but are steady in value; 1,000 tons 50 lb. Erie, sold on private terms. Refined Bar from store is unusually quiet, but nominally steady at our quotations.

LEAD—Since the considerable business in Pig, noted in our last, the market has been quiet, and we hear of no sales; prices are unchanged. Bar and Pipe are quoted at 7¼ @ 7½c., and Sheet 7¼ @ 8c. net cash.

STEEL.—Both Foreign and American descriptions continue steady at our quotations.

SPELTER.—In the absence of business, prices of Foreign are entirely nominal; the quotation ranges all the way from 5¾ up to 6¼ cents, gold.

TIN.—Since the recent large speculative purchases of Pig, the market has been comparatively quiet; prices, however, are sustained: 300 slabs Straits sold at 32¼@32⅜ cents; English nominally 32½@¼, and Banca 37@38, all gold. Plates were seldom, if ever, of late years, as dull at this period of the season as now; prices are easier, and we again reduce our quotations, though at the lower ruling there is no response from buyers, and we hear of no sales.

ZINC.—Sheet is quiet and steady at our currency quotations for lots from dealers' hands—50 casks Mosselman from agents' hands, sold to arrive at 8 cents less 4 per cent., gold.

ZINC.—Am. Ox., 6¼ @ 7c.; French, 10 @ 11c.; Sheet, 8¼@9¼c.; Manganese, 4 @ 4½c.

San Francisco Stock Market.

We have reports from the San Francisco Stock Board dated December 6th. Our quotations do not materially vary from last week. Below is the report in full:—

Yellow Jacket	no sales.
Kentuck	37
Chollar Potosi	75
Gould & Curry	77
Belcher	63¾
Imperial	no sales.
Amador	20
Crown Point	—
Savage	41½
Hale & Norcross	—

The Slate Trade.

This week we are enabled to present to our readers a report of the slate shipments from Fairhaven for the week ending December 3d. We are now in position to give complete reports of all the mantles, mill stock, billiard beds and black boards shipped from the Vermont slate region. This includes also what goes to market from the quarries and mills in the State of New York. This is a point of great importance to the slate trade, and one which will tend to give stability to the trade, by showing just what each individual company is doing, as well as what is going on in each town. Arrangements are in progress by which we hope to give the readers the total shipments of slate from all the quarries in the United States. It will, of course, require time to make all necessary preparations, but we are determined to do it, believing that it is a thing greatly needed by the trade.

[Corrected weekly.]

(A "square" represents 100 superficial feet.)

PRICES OF ROOFING SLATE.

Vermont purple, 1st quality, per square	$6 50@ 7 00
" green, 1st " "	6 50@ 7 00
" red, 1st " "	15 00@16 00
" variegated, "	5 75@ 6 20
Pa. b'k and d'k blue, 1st qual., "	6 00@ 7 05

VERMONT SLATE TRADE.

REPORT of Slate Shipped from Middle Granville, N.Y., via the R. & S. R. R., for the week ending December 3, and for the year 1870.

ROOFING SLATE.

NO. OF SQUARES.	Week.	Prev'ly.	Year.
Penrhyn Slate Co	100	6 351	6,451
New York Slate Co	....	3,170	3,170
Middle Granville Slate Co	20	697	717
American Slate Co	....	....	....
Benj. Williams	....	1,368	1,368
Jones & Williams	....	126	126
Eagle Slate Co	....	194	194
H. W. Hughes	....	235	235
J. D. Jones	....	35	35
Total	120	12,180	12,300

MANTELS, &C.

NO. OF CASES.	Week.	Prev'ly.	Total.
Eagle Slate Co	....	....	....
Penrhyn Slate Co	204	2,153	2,257

MILL STOCK.

NO. OF CASES SHIPPED BY	Week.	Prev'ly	Total.
Eagle Slate Co	cars 2	28	30
Penrhyn Slate Co	" —	—	—

Fair Haven, Vt.

Report of Slate Shipped from Fair Haven, via the R. & S. R. R., for the week ending December 3, 1870, and for the year.

ROOFING SLATE.

NO. OF SQS. SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
Scotch Hill Slate Co.	184	..	..
Joseph Sheldon	35	.	..
A. Allen	..	..	..
Union Slate Co.	192	..	..
R. M. Copeland	..	..	..
F. H. M. & M. S. Co.	156	.	..
Benjamin Williams	..	..	..
E. E. Loyd	..	..	..
Total	567	..	.

MILL STOCK—MANTELS.

NO. PIECES SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
F. H. M. & M. S. Co.	668	..	..
Union Slate Co.	60	..	..
S. Allen	75	..	..
Total	803	..	..

FINISHED MANTLES.

NO. OF CASES SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
F. H. M. & M. S. Co.	295	..	..
Burke & Kellogg	12	..	..
Union Slate Co.	20	..	..
Total	327	..	..

BILLIARDS AND BLACKBOARDS.

NO. OF CASES SHIPPED BY,	WEEK.	PREVIOUSLY.	YEAR.
F. H. M. & M. S. Co.	..	..	..
Union Slate Co.	60	..	..
S. Allen	..	..	..
Total	60	..	..

PENNSYLVANIA SLATE TRADE.

SHIPMENTS OF SLATE OVER THE LEHIGH VALLEY, AND LEHIGH AND SUSQUEHANNA R. R., AND THE LEHIGH CANAL:

For the week ending Dec. 3, 1870.

LEHIGH VALLEY R. R.

ROOFING SLATE.

Girard Slate Co.	450 squares.
Jones & Williams	210 "
D. Williams & Co.	105 "
Saylor & Morgan	70 "
H. Williams	70 "
Lehigh Slate Co	35 "
American Slate Co.	35 "
Total	975 "

SCHOOL SLATES.

D. Williams	26 cases.
Lehigh Slate Co.	44 "
Locke Slate Co.	1 "
Total	71 "

BLACK BOARDS.

Yerkes & Martin	15 "

MANTELS.

Yerkes & Martin	64 "
Lehigh Slate Co.	30 "
Total	94 "

MILL STOCK.

H. Hughes	1 "

TILING, &C.

Lehigh Slate Co.	10 "
Yerkes & Martin	8 "
	18 "

LEHIGH AND SUSQUEHANNA R. R.

ROOFING SLATE.

Twin City Slate Co.	80 squares.
N. Y. & Penn.	40 "
J. M. Coffin & Co.	35 "
William Parry	35 "
Mauch Chunk Slate Co.	24 "
Total	214

	Dec. 3.	Previously.	Total for Year.
L. and S. R. R.	875	11,127	11,341
L. V. R. R.	214	23,478	24,453
Lehigh Canal	975	4,762	4,762
Total	1,189	39,367	40,556

SWAIN'S TURBINE WHEEL.

[From the Daily Citizen and News, Lowell, Mass.]

SWAIN'S TURBINE.—The Swain Turbine, to which we have several times referred in our columns, has, within the past year and a half, as we learn, been subjected to a series of very careful tests, by two of the most thorough hydraulic engineers in this country, and, we are glad to know, with the most gratifying results. Lowell people are so well satisfied with them, that several are being put into the mills in this city. Two of these sixty-inch motors have been constructed for the Massachusetts Cotton Mills, one of which is now running in the Prescott Mill, while the second one is being put into its place in the same building. The one in operation is giving excellent satisfaction, and it is in contemplation to put in two more of the same size in pits now occupied by Boyden turbines, by which power enough will be obtained even in considerable stages of high water to drive the entire works on that side of Merrimack street. When completed, as suggested, the wheel-room will extend the entire length of the basement. The wheels will be in the same line, the main shaft, with its large pulleys, carrying belts at the rate of 4,500 feet per minute, extending along over the wheels, with the gearing so arranged that any one of the four motors can be stopped or run at pleasure.

This size has heretofore been rated at 185 horse power, under a head of 18 feet, but should their performance equal the best results of the tests the power will be equal to 206 horse power each. We learn further, that contracts have been made with the Merrimack Print Works, for one 18-inch bronze turbine to drive their repair and box shops; and with the Lawrence Manufacturing Company, for one 24-inch turbine; and one 80-inch turbine with bronze floats and guides, of 350 horse power, at 75 per cent. under a head of 18 feet. Contracts have recently or are now being filled for Messrs. Oliver Ames & Sons, North Easton; Littlefield Bros., Pawtucket Hair Cloth Co., Pawtucket, R. I.; Lewiston Bleachery, Lewiston, Me.; Cumberland Mills, near Portland, Me.; Underhill Edge Tool Co., Nashua, N. H., L. L. Brown & Co., South Adams, and others.

We append two letters from one of the patrons of this wheel, which speak for themselves:

LOS GATOS FLOUR MILLS,
July 27th, 1869.

A. M. SWAIN, Esq.—Dear Sir: Yours of July 10th, saying you would ship the small wheel in a month, is received. We shall be interested to know the result of your tests at Lowell. If all could see your little wheel working under 60 feet head at our place, the gates working with the greatest ease, and know that it has run 800 revolutions per minute nearly all the time for two and a half years without a cent for repairs, or for a moment being out of order; the gate closing so tight as to scarcely leak a drop—and then compare it with our Leffel wheel, whose gates work so badly that we have to shut the water out of our pipe to stop it—having broken down, in the gate, many times and cost us $180 for repairs during the one and one-half years we have run it, and we think it would not take long to decide which is the best wheel.

Truly yours, ROGERS & Co.

LOS GATOS FLOUR MILLS,
Santa Clara Co., Cal., Sept. 27th, 1870.

SWAIN TURBINE Co.—Gents: We have made a few test runs, on the Leffel and Swain wheels, both drawing water from the same pipe, and both under the same head—60 feet—both driving the same machinery, excepting mill stones, being each geared to two runs of 4½ feet stones. The Leffel wheel is 13½ inches diameter, with shutes 2½ inches deep. A brass wheel, with brass shutes, new. The Swain wheel is 12 inches diameter, with 1½ inches depth of bucket, also new. Our stream is very low and we use a small reservoir. The water flowing into this reservoir has not varied any for the past month, as we have no rains, and the supply comes from springs.

Sept. 7th.—Water 3 feet 9 inches deep in reservoir. Started one run on Swain wheel at 7:20 A. M.; run until 2:20 P. M.; made 23¾ barrels XXX flour; water 11¼ inches deep when stopped.

Sept. 8th.—Water 3 feet 10 inches in reservoir; started at 6:15 A. M.; one run on Leffel wheel; run until 12:15 P. M.; made 20 barrels XXX flour; water 10¼ inches deep when stopped.

Sept. 9th.—Water 4 feet 2½ inches deep in reservoir; started 2 runs on Leffel wheel; gave the wheel full gate at 7:10 A. M. Stopped at 12 M.; water all gone; run as long as water lasted, and until machinery stopped; small 25¾ barrels XXX flour in 4 hours and 50 minutes; both stones fresh dressed and in good condition.

Sept. 10th.—Water 4 feet 2½ inches deep in reservoir, (being the same as yesterday); started two runs on Swain wheel and same machinery as yesterday, at 7:40 A. M.; stopped at 1:35 P. M., for want of water; made 27⅛ barrels of barrels XXX flour.

Sept. 19th.—Water 4 feet 10 inches deep in reservoir; started one run and mill machinery at 1:30 A. M. on Swain wheel, stopped at 1:30 P. M.; water 10 inches deep when stopped; made 34 barrels XXX flour.

Sept. 26th.—Water 5 feet deep in reservoir; started one run and mill machinery at 1:15 A. M. on Leffel wheel; stopped at 11:35 A. M.; made 30 barrels XXX flour: water 9½ inches deep in flume when stopped.

It is the opinion of all hands that this last run on Leffel wheel would have made 36 to 37 barrels flour on Swain wheel.

When 2 runs were used on the Swain wheel, the gate was never quite open, while the Leffel run with full gate. On the tests made on one run on Swain wheel, the gate was from ¼ to ½ open, and about the same on the Leffel wheel, with one run.

We have made several other tests, all giving about the same average results as the above. We consider the stones on the Leffel wheel faster grinders than those on the Swain wheel, and capable of doing the same work with a little less power.

Your wheel will be our low water wheel from this on; in high water most any wheel will do.

Truly yours, ROGERS & Co.

Mining Legislation.

By ECKLEY B. COXE.

A Paper read at the General Meeting of the American Social Science Association, at Philadelphia, October 25, 1870.

[Continuation.]

WE have now mentioned the principal causes of what are generally termed accidents in mines; but there is another class of dangers which, although seldom referred to, often occasion the loss of more years of life, than any of those cited in the foregoing pages. The health of the miner is seriously impaired, and his life often much shortened, by exposure to wet and cold, or to sudden changes of temperature, by working in air which, although capable of supporting combustion, is too impure to be breathed for a long time with impunity, by inhaling gritty particles and lamp-smoke into his lungs, and, finally, by climbing up and down ladders in going to and from his work. When a workman is obliged to ascend and descend several hundred feet in this way every day, the effect upon his general health is soon very marked, and is most pernicious. The men climb up (or down) one after the other, each with a lighted lamp in his hat or hand; now as this severe exertion causes violent respiration, they inhale into their lungs large quantities of the lamp-smoke; this is one of the principal causes of "black" or miner's consumption. Upon arriving at the top or bottom, they are generally tired and heated, and consequently stop to rest, and thereby become chilled. The danger from these causes of disease is greatest in metal mines, which are commonly supposed to be much safer than coal mines, and their effects are so pernicious that the average duration of the life of the metal miner, where the shafts are deep, is generally much less than that of the collier, who is exposed to the additional danger of explosions of fire-damp. In coal mines where the latter is met with, the ventilation must be very perfect in order to keep them safe, and the miner works always in very pure air. It is also much cheaper to drive airways in coal than in rock. The great supply of pure air, and the fact that the miner is generally let down and drawn up the shaft by machinery, add many years to his life.

Although legislation can do, and has done much to protect the miner from these causes of disease, yet it is also very necessary that he should receive instruction as to the proper precautions to be taken for the preservation of his health. In Europe all mines infested with explosive gases are subjected to very strict regulations as to ventilation, and the inspectors are required to examine them constantly. This portion of the mining code should be drawn up with the greatest care.

The laws which may be classed under the third head, *i. e.*, those relating to mines as a source of national wealth, are to be found only in the codes of continental Europe. Every operator is there allowed to work his mine up to its full capacity, but he is not permitted to do so in such a way as to compromise the safety of the mine, or to destroy or render useless any ore or mineral in the deposit. This is often done; in this country, alas! it is the rule rather than the exception. Very often the richest ore only is taken out, and thousands of tons of poorer stuff, which may never again be reached, are left behind. Sometimes, in order to save expense, the timbering is made too light, and much good ore is lost by the caving in of the mine. In Europe it is the duty of the government engineers to see that no such wanton waste occurs, and to stop the mine, if that be necessary, to prevent it.

Let us now consider what should be done in this country, confining our remarks to the older States, where the general government has no interest in the land, and where the laws must be enacted by the State legislatures. We need not consider the question of the title to mines, that belonging to the province of the lawyer, as the minerals go with the surface right. We will devote our attention more particularly to the laws which may be classed under the second head. In all countries where the right to mine must be obtained from the State, the latter can impose any conditions upon the operator which it sees fit; for they are really only the terms of the lease under which the mines are worked, and the parties undertaking to open them are perfectly aware of what will be required of them before they expend any money. In this country, as in England, the government can only interfere where it is necessary to do so in order to protect the life or property of the citizen. Mining is no way different in the eyes of the law from any other industry. Although the State is bound to see that the miner is subjected to no unnecessary danger, yet it is equally its duty to protect the workmen in powder mills, the hands in factories, the passengers upon railroads, and the citizen in his home when his life is placed in jeopardy by the erection of unsafe steam boilers near his dwelling. The duty and the right of the government to interfere in all the above cases are based upon the same principles. Although there is a great and pressing need of a good, well-digested code of mining laws in this country, the method adopted at the last session of the legislature to obtain it is not, I think, the most advisable.

The subject of mining legislation is not a new one; able experts in England, France, and Germany have been studying it for many years, and it is very important for us to profit by the results of their labors. In preparing a mining law it would not be wise, I think, to base it, as has been done, upon the assumption that one class of persons to be affected by it—I mean the operators—are not to be consulted, the law being intended merely to protect the workmen from them.

In drawing up the act three parties are to be considered—the miner, the mine owner, and the general public. The first and main object of such legislation is, of course, the safety of the miner, and to this all other considerations must yield, but, at the same time, care should be taken to impose no useless restrictions upon the operators, to make the law as simple as possible, and to frame it in such a way as to prevent any feeling among those affected by its provisions, that their interests have been uselessly sacrificed.

A mining law should, if possible, be satisfactory to both workman and operator, who should feel that there was no intention to oppress either, otherwise the law will be obeyed with great reluctance; it should contain no illegal provisions, which, if contested, would be over-ruled by a court of justice. It is important to the whole country that the mines should be required to make no useless expenditures, as this will cause an increase in the cost of production of the mineral that may seriously affect those industries which are dependent upon the mines for their supplies. All such expenditures fall eventually upon the consumer, and if uselessly made through ignorance, are a national loss of labor or capital.

If a good mining code is to be enacted in any State, a commission or committee should be appointed to frame it, which should consist of, or at least have the advice of, one or more persons learned in the law, of one or more persons skilled in mining and well acquainted with the mining legislation of Europe, of one or more practical miners, who are familiar with the dangers to which they and their fellows are exposed, and who would represent those to be protected, and finally, of one or more persons interested as operators or owners of mines.

In drawing up the law, it is important that no provision should be inserted which would be declared unconstitutional by the courts. If any clause in the act were decided to be illegal, parties would be encouraged to contest some of the other provisions, and much time would be lost before it could be brought into regular operation. It would be the duty of the mining engineers to examine the mining codes of Europe, to collate all that had been done previously, and to furnish to the committee the scientific groundwork of the act. They could also give advice if a dispute arose between the representatives of the workmen and of the operators. The practical miners would call the attention of the committee to the dangers to which they were particularly exposed in the state or country in question. Each mining district has its own peculiar sources of peril: in one it is the fire-damp, in another the water, in a third the bad roof, in a fourth the great thickness of the vein, etc. These points should be carefully considered, and a man who is daily exposed to such dangers could afford much assistance to the committee in their work. The owners and operators of mines who, as in Pennsylvania, have invested hundreds of millions of dollars in purchasing, opening and improving their properties, and in building railroads for the transportation of the products of their works, should also be heard, not for the purpose of thwarting any legislation which might be necessary for the safety of the men, but to prevent the insertion of useless or oppressive provisions in the law, like some of those to be found in the act lately passed by our legislature. If all parties were heard before the bill passed finally, the law would be obeyed much more cheerfully, both in letter and spirit.

No matter how well digested the provisions of the act may be, it will always be difficult to carry them into effect, unless the persons charged with the duty of inspecting the mines are well-educated, experienced and honest mining engineers or viewers. Such officers can only be obtained by establishing good schools for civil and mining engineering. The appointments should be made by competitive examination, those showing most theoretical and practical knowledge to be chosen. There should be different grades of inspectors, so that faithful service would certainly be rewarded by promotion. All appointments should be for life or good behavior.

It is also important to provide schools for the education of working miners, in which they could be fitted for the responsible post of mine boss, as the over-man or master miner is called in this country. The course of instruction should be so arranged that the miner could, while pursuing his studies, support himself by working in the mines. He would not, of course, be able to gain as much as those not attending the school, but he could earn enough to pay his expenses. For this reason the schools for master miners should be located in the mining districts, where work could be obtained. The course of instruction should embrace the elements of geology, chemistry, and mechanics, with special instruction in mining and underground surveying. Such schools exist in many parts of Europe, and have been found to be eminently useful. Although I am not aware that the plan has ever been tried, I think that much good could be done by introducing into the common schools of the mining districts an elementary course of instruction upon the subject of mining, with special reference to the health and safety of the miner. If such provisions for the instruction of all classes of persons employed about the mines were made, one of the greatest difficulties in framing and carrying out good legislation upon mining would be removed. It is important that there should be some person or board to whom appeal could be made when disputes arise between the local inspector and the operator, and who would have the power of suspending some of the provisions of the act, or of imposing temporary restrictions upon the mines, in cases of emergency. This could be arranged by having several grades of inspectors. At present the inspector in Pennsylvania stands alone; there is no one to whom he can appeal in case of doubt, and no one whom the operator can call in if he thinks the inspector is wrong. The operator can now appeal only to a court of justice. In Europe the case is different; in England an appeal can be made to the Secretary of State, who appoints a commission to investigate the subject; on the continent the same thing is done by the higher mining officials.

It is of the very greatest importance that the men should be obliged by law to obey the orders given them in regard to mining, timbering, use of lamp, etc., by those placed over them. No law and no care of the inspectors will be of much avail if the men are at liberty to disobey the instructions given them in regard to their work, the use of their lamp, or the precautions to be taken to avoid accidents. In all the mining codes of Europe there is a provision compelling the directors of mines to adopt rules for the management of the works, and these, when approved of by the inspector, become part of the mining law, and every one employed about the mines is obliged to obey them. Unfortunately there is no such clause in the law lately adopted in Pennsylvania. Many persons have an erroneous impression that mining is a peculiar subject for legislation. In those countries where the right to mine must be obtained from the government, the latter can, of course, impose much greater restrictions upon mining than upon other industries. In this country, on the contrary, the right to mine belongs to the proprietor of the surface, and the state can only interfere when the lives or property of others are endangered, and it is then its duty to do so. The case is, however, the same with railroads and powder-mills. If it is the duty of the government, before allowing one citizen to employ men in his mine, to see that proper precautions have been taken to protect the miner not only while at work, but also in going to and returning from it, so long as he is underground, it is certainly also the duty of the state to see that the hands in factories are equally well taken care of, that they are exposed to no healthy atmosphere or danger of being injured by the machinery, and that the lives of passengers on railroads are not placed in jeopardy by unskilful engineering, by false economy in the purchase of bad rails and inferior rolling stock, and by neglecting to introduce all improvements which add to the safety of railroad travelling. The same is true of steam-boilers, when they are erected in populous districts. These matters are all placed under the surveilance of government engineers on the Continent of Europe. Human life is of equal value somewhere, and what is wanted is not simply a good mining law, but a well-educated corps of experts acting under a well-digested code, whose duty it should be to inspect all mines, manufactories, steam-boilers, and railroads, and to see that the proper precautions have in all cases been taken for the safety of life and property. Although thousands of persons have lost their lives in mines in the last twenty years, yet the number of those who have been killed and injured upon railroads or other public works is much greater. One general law could be made to comprehend all the above cases, and one corps of engineer could see that its provisions were carried out. One of the most important functions of such a corps would be to suggest modifications in the law, either for the purpose of securing greater safety for the workmen, or of relieving the various industries from useless restrictions.

They could also do much to improve civil and mining engineering, by reporting the various improvements adopted in different parts of the Old and New World in some periodical similar to the *Annales des Mines*. There should be some provision in the law to prevent persons who have not properly learned their trade from being received in the mines as miners, firemen, or machinists. In this country there is no such regulation, and incompetent workmen are often put in charge of machines or employed to do work, which they do not understand. This is a frequent cause of disaster.

The ideas which I have wished to express in the foregoing pages may be summed up as follows:

In the first place, a mining code should form but a portion of a general system of legislation for the better protection of the workmen employed in the various branches of industry. In framing such an act, the advice of able legal and scientific experts should be taken, and all parties whose lives or property are to be affected by it should be consulted, or at least afforded an opportunity of being heard.

No matter how perfect the law may be when passed, it will need constant modification as improvements are made in the different industries. It would also be necessary to have a corps of well-educated experts of several grades to superintend the execution of the law. Proper schools should be provided for their education, and they should be promoted from one grade to another for merit alone. I would also insist upon the importance of establishing schools for master miners, in which any one who works in the mines could, while supporting himself by his labor, receive sufficient instruction in his business to qualify him to direct intelligently the underground workings of a mine. I think it very advisable to instruct the pupils of the common schools of the mining districts in the general principles of what the French call the "*hygiéne des mineurs*," so that they may understand the dangers to which they will hereafter be exposed, and be able to afford relief to any one who had met with an accident. In this way all those engaged in and about the mines would be able to understand the provisions of the law and to aid in carrying them out intelligently. I would also again insist upon the importance of preventing the employment of ignorant or incompetent workmen in places where their want of skill may be the cause of disaster.

DRIFTON, JEDDO P. O., PA. ECKLEY B. COXE.

New Publications.

THE PACIFIC RURAL PRESS.—This is the title of a new agricultural and home journal, the first number of which Messrs. DEWEY & Co., the publishers of the well known *Scientific Press*, propose to issue on the seventh of January next. Judging from their announcement and from their reputation as competent and painstaking journalists, we bespeak for the *Rural Press* not only a large subscription list in the far Western States, but a liberal complement of names in the East. The new journal will be a weekly of sixteen large pages, and will, we believe, contain illustrations. The subscription has been set at $4 per annum; clubs of ten, $3 each. Address DEWEY & Co., San Francisco, California.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.**]

Breech-Loading Fire Arms..... 369
Professor Huxley on the Formation of Coal..... 369
The Warson Æro—Steam-Engine..... 369
On the Examination of the Bessemer Flame with Colored Glasses and with the Spectroscope..... 270
The British Navy..... 270
Three Different Methods of Sinking Through Running Sand.. 371
Mining Statistics of Great Britain..... 372
MINING SUMMARY..... 372
MARKET REVIEW..... 374
THE SLATE TRADE..... 375
Mining Legislation..... 376
New Publications..... 376
EDITORIALS:
American Metallurgy of Gold and Silver..... 378
Office of Commissioner of Patents..... 377
Lake Erie Coal Trade..... 378
The Future of Mining in Spain. 378
The Missouri Tin Question again 378
The Marquette Iron District.... 378
OFFICIAL LIST OF PATENTS..... 379
Bituminous Coal Trade on Lake Erie..... 380
BUSINESS AND PERSONAL..... 380
Important to Inventors..... 380
ADVERTISEMENTS..... 381

ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

SUBSCRIPTION—**$4** *per annum in advance;* **$2 25** *or Six Months.*

ADVERTISEMENTS.—*The rates are as follows: Inside pages,* **25** *cents per line each insertion; the outside or last page,* **40** *cents per line. Payment required in advance.*

NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No.* 121 *Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

Correspondence and general communications of a character suited to the objects of THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twelve cents a year, payable quarterly, in advance, at the office where received.*

GEO. E CUMMINGS *is our Agent at Philadelphia. Office, 429 Chestnut street.*

WESTERN & COMPANY,
Publishers,
37 PARK ROW,
P. O. Box, 5969. NEW YORK CITY.

American Metallurgy of Gold and Silver.

IT is quite generally believed by men of science abroad, and frequently repeated by those who ought to know better at home, that we are blundering along in this country in the treatment of our gold and silver ores, totally ignorant of the experience already gained in older countries; that somebody should be sent to Europe by our Government to study the methods of gold and silver metallurgy there employed, and to enlighten us with the results.

A large class of persons, on the other hand, scout the idea of all science from Europe, and point to the fact that we already surpass every country in the world, unless it be Australia, in the completeness and economy of our gold-extraction, while all the imported processes have hitherto failed.

The truth lies between these extremes. American metallurgy is neither wholly in advance nor wholly in the rear of the same science in other nations. Out of our peculiar circumstances and conditions we have developed some distinctively American processes with which Europe cannot compete, because the experience of Europe has not led to the perfection of such devices. Thus the hydraulic system of mining, adapted to work cheaply large areas of auriferous earth, is native and peculiar to this country, and is employed on a larger scale and in greater perfection here than anywhere else. The California stamp-mill, with all its modern improvements, cannot be surpassed in the world for completeness of design and mechanical simplicity. Russia and Hungary cannot show such economical amalgamation as we do. Even in the treatment of tailings and sulphurets, we have employed and improved nearly all the European methods which our economical conditions will admit, and we have invented several of our own—such as the pan-process, the Brückner cylinder, etc., which seem to be much more promising than the plan of the eminent Professor RIVOT, which has repeatedly failed among us, and never succeeded. Again, in the treatment of silver ores, the Washoe process of pan amalgamation is an outgrowth of American necessities, a hybrid from the arrastra and the patio, original with us, and not only remarkable in itself, but capable of modifications and applications which considerably diminish the realm of smelting. The Freiberg barrel-amalgamation is indeed adopted in many places; but we have, in place of laborious roasting in reverberatories, the cylinders of BRUCKNER, and the shaft furnace of STETEFELDT, both American inventions; that is to say, the product of foreign science, stimulated and directed by actual experience in this country. All the instances just given testify that we are not without an American metallurgy. Even now, it is necessary for foreign governments to send agents here to study our methods and report at home. We know the processes of Europe better than Europe knows ours.

True, this American metallurgy which is springing up is sadly desultory, incomplete, untrained and unsystematized. Each step of progress costs more than it should. Thousands of experimenters waste their time in trying processes that have failed already, but of which they have no record. Many devices, even, that have been thoroughly tested and condemned in Europe, spring up to enjoy a flourishing though brief career among our enterprising and ingenious people, not learned in their history. But many more originate among us, and, for want of harmonious action or organization among the mining interests, they are tried here and there, and the results of each trial smothered or magnified, so that it takes much more time and money than it ought to require to produce in the public mind the notion that a particular plan is beyond doubt good or bad. To furnish a nucleus of experience and an exchange of information, to settle many important points yet mooted in our incomplete American system, to consolidate and cheapen our progress, a national school of mines seems to us to be absolutely required.

The California stamp-mill process for gold is described in a number of well-known books, perhaps most completely in that of Mr. J. ARTHUR PHILLIPS on Gold and Silver. It is admitted to be the best method thus far developed in actual practice on a large scale, for the treatment of auriferous quartz. The idea of smelting the ordinary auriferous quartz (even of low grade) has been put forward at different times by the possessors of patent fluxes; but its absurdity will appear if we reflect that every five dollars' worth of gold in a ton of quartz constitutes but one one-thousandth part of one per cent., or one one hundred-thousandth of the whole mass. To smelt auriferous quartz, therefore, is to flux and remove, practically, one hundred per cent. of quartz. The case is different when the barren material is not quartz, which needs a base before it will flux, and still more widely different where the ore contains some other useful metal beside gold, such as lead or copper, and where the gold, for some reason, escapes the stamp-process. There is a field for smelting which may become important and extensive, but it never can supersede amalgamation.

The treatment of sulphurets under the stamp-mill system has been a question of considerable difficulty. These are usually iron or copper pyrites, containing gold. The different practicable methods of treating them so as to secure the gold may be classified as follows. Concentration should in every case precede, where the amount of sulphuret is not large in proportion to the gangue:

1. Natural decomposition by time.
2. Roasting and amalgamation.
3. Pan amalgamation with chemicals.
4. Smelting.
5. Chlorination.

Of these methods the first is the cheapest, but it is not equally practicable for all varieties of pyrites. Some pyrites decompose very quickly when exposed to the weather, especially if it is from time to time drenched from a hose. In favorable localities the manufacture of copperas might be combined with the elimination of the sulphur in this way. After a suitable time the heaps of tailings could be again run through the mill, and a considerable quantity of gold extracted. This slow oxidation does not seem to produce rusty gold. In the Southern States this simple expedient was quite common thirty or forty years ago, and we have heard of instances in which the second or third milling of gold ores produced as much gold as the first.

The plan of roasting the ore to remove sulphur, and then amalgamating it, seems very rational, but it cannot yet be said to have succeeded. The roasting apparatus, invented in such abundance, has frequently been quite imperfect. In no other department of metallurgy have our inventors made such a brave show, with so little real success. Their plausible experiments turned on the fact that whatever is done to sulphurets, the first change produced is and must be a partial desulphurization. Hence the pyro-ligneous acid, the superheated steam, the cold bath, the hot bath, and numerous other fanciful inventions, comparing their results with the results of no process at all, could always claim to have desulphurized more or less of the original mineral.

But other and more scientific appliances seemed equally to fail. The reverberatory, the Gerstenhöfer terrace furnace, the Brückner cylinder, have all been tried on gold sulphurets in Colorado, though it is claimed that they have not been thoroughly tried, and that the practical success of the reverberatory and the cylinder in treating silver ores for amalgamation, promises better results than have yet been achieved with gold ores. However this may be, the fact is strongly indicated by careful experiments in San Francisco, that the roasting of auriferous sulphurets produces rusty gold, which will not amalgamate. Experiments at Central City go to show that, by the addition of salt to the roasting charges toward the end of the process, the coating of iron oxide may be converted into a chloride and removed. This expedient would probably be impossible in the Gerstenhöfer, where the addition of salt would cause the ore to cake on the terraces. Whether the Stetefeldt furnace can be adapted to such a purpose remains to be seen. This is a subject still requiring investigation; and the essential problem is not to invent a new desulphurizer, as many suppose, but to find out whether desulphurized ores can be successfully amalgamated, and if so, how.

The system of pan amalgamation with chemicals is gradually gaining ground in California. The theory of the pan process, both for gold and silver ores, has been but little understood by those who, being skillful and practical mechanics, were, in spite of their ignorance of chemistry, our best mill-men. The use of chemicals, therefore, has been largely a matter of whim or of superstition. But there is no doubt that chemical reactions, involving the decomposition of sulphurets, may be brought about in pans by using proper chemicals *in adequate quantity*. This is another direction in which quiet but highly important progress is to be expected.

Smelting is not to be employed except when base metals can be obtained as well as gold. It is one of the most complete, but at the same time one of the most expensive methods; and for a country like ours, it has the great inconvenience that it is a continual process, without pauses—in a word, without "clean-ups." It requires constant assays to control it. The only way to conduct it economically is to perpetually put back into each stage of the process certain classes of assorted semi-refuse; and thus the proceeds of each charge of ore are lost in the general average product of the works. It follows that custom work, such as the mills perform, is impossible at furnaces. They must buy ores on assay, and take their chances as to profit. This combines mercantile with metallurgical risk, and it is often the case that the proprietor of the smelting works, to protect himself, puts his price list for ores so low as to drive away customers, or, to attract customers, pays so much for ores as to ruin himself. The only way to adapt smelting to our gold and silver industry is, in our opinion, to have smelting establishments under separate administration, abundantly supplied with capital, officered with the best skill in metallurgy and business, and supported by the purchase of various ores, which, by mixture, can be made to yield their valuable contents more economically than would be possible with the product of a single mine. The success of Professor HILL in Colorado, is a comment upon this proposition.

Chlorination is a German process, introduced by the celebrated PLATTNER, Professor at Freiberg. It has, however, been considerably improved in this country, especially by Messrs. KUSTEL, DEETKEN and HOFFMANN. It is the most thorough of all gold extraction processes; but, in its ordinary application, it leaves the silver in an insoluble form in the ore. This could be extracted by subsequent leaching with hot brine, or the double-chlorination (a Hungarian process) could be employed, which gives a final solution containing the chlorides of both gold and silver. In most ores to which chlorination has been applied, however, the contents of silver are so small as to be overlooked.

The amount of sulphurets extracted in gold ores, outside of Colorado, is thus far very small. When concentrated for special treatment, they do not amount to enough, at any one mine in the country, to keep a small chlorination apparatus continually running. The sulphurets of Colorado, however, constitute in many cases the great part of the ore. They are not disseminated sparsely in quartz; hence they cannot be easily concentrated to a high value. It seems to us, therefore, that for the average grade of Colorado sulphurets, natural decomposition, or the improved pan process with chemicals, affords at present the greatest promise. The former might be tried without much expense, as many mills have saved large heaps of tailings.

From the foregoing summary it may be seen how little Europe has to do with our present stand-point in the treatment of gold ores. What she can give us is the scientific spirit and training which will construct out of the abundant materials at hand an American art of gold metallurgy.

In the treatment of silver ores, America has given birth to two most important processes, the patio and the pan amalgamation. Of these, the former is not in use in the United States, experience having shown the climate, in most of our mining districts, to be unfavorable to it. There are some, however, who still think it might be in certain localities successfully employed. The pan amalgamation is the so-called Washoe process, and consists in passing the pulp from the stamp-batteries into pans, where it is stirred or ground, together with quicksilver, and sometimes with chemicals, especially copper-vitriol, and salt. The practices of mill-men continue to differ widely, and many points of vital interest and importance remain as much unexplained as ever. Two improvements are, however, unquestionable. The first is the increase in the size of the pans; and the second is the adaptation of the Washoe process to refractory ores by means of chemicals in the pans.

The Freiberg process, as it is called in this country, consists in the roasting of refractory ores with salt and their subsequent amalgamation. The amalgamation is generally carried on in pans, whereas the true Freiberg method employs barrels. The dispute between the advocates of the two kinds of amalgamation is not yet settled.

The manner of performing the preparatory chloridizing roasting is a matter of great importance. This is the most expensive part of the treatment, and the rapid disappearance of fuel in the silver-mining districts renders economy in that item highly desirable. It is here that the Brückner cylinders and the Stetefeldt furnace have found their field of usefulness hitherto; and if they accomplish no more than they have done already, they will justify us in claiming for America the most valuable contributions that have been made to the metallurgy of silver in the last five years.

Office of Commissioner of Patents.

THIS office has recently become vacant in consequence of the resignation of Commissioner S. S. FISHER, who, as we are informed, returns again to the practice of his profession in Cincinnati. Several prominent individuals are named to fill this vacancy, but who will receive the appointment remains to be seen. The present assistant, and now acting Commissioner, Mr. SAMUEL A DUNCAN, has our preferences. We believe him to be cautious and just in all his decisions, and from his knowledge and experience in the office, through the administrations of different Commissioners, eminently qualified for the discharge of its executive duties.

The Patent Office is now brought to such a perfect working system that long delays seldom occur in properly-prepared cases in any class of inventions. From the most favorable expressions of many connected with the office, there is no doubt but the appointment would be satisfactory in that direction, as well as to solicitors and attorneys doing business with the office. In the event of General DUNCAN'S appointment to the position of Commissioner of Patents, the rules and regulations of the office now in force would no doubt remain substantially the same. Heretofore it has been customary for every new Commissioner to revise and modify the existing rules as seemed best to him for the administration of the office. Probably this would be the case in the present instance, if any outsider were

Mining Legislation.

By ECKLEY B. COXE.

A Paper read at the General Meeting of the American Social Science Association, at Philadelphia, October 25, 1870.

[Continuation.]

WE have now mentioned the principal causes of what are generally termed accidents in mines; but there is another class of dangers which, although seldom referred to, often occasion the loss of more years of life, than any of those cited in the foregoing pages. The health of the miner is seriously impaired, and his life often much shortened, by exposure to wet and cold, or to sudden changes of temperature, by working in air which, although capable of supporting combustion, is too impure to be breathed for a long time with impunity, by inhaling gritty particles and lamp-smoke into his lungs, and, finally, by climbing up and down ladders in going to and from his work. When a workman is obliged to ascend and descend several hundred feet in this way every day, the effect upon his general health is soon very marked, and is most pernicious. The men climb up (or down) one after the other, each with a lighted lamp in his hat or hand; now as this severe exertion causes violent respiration, they inhale into their lungs large quantities of the lamp-smoke; this is one of the principal causes of "black" or miner's consumption. Upon arriving at the top or bottom, they are generally tired and heated, and consequently stop to rest, and thereby become chilled. The danger from these causes of disease is greatest in metal mines, which are commonly supposed to be much safer than coal mines, and their effects are so pernicious that the average duration of the life of the metal miner, where the shafts are deep, is generally much less than that of the collier, who is exposed to the additional danger of explosions of fire-damp. In coal mines where the latter is met with, the ventilation must be very perfect in order to keep them safe, and the miner works always in very pure air. It is also much cheaper to drive airways in coal than in rock. The great supply of pure air, and the fact that the miner is generally let down and drawn up the shaft by machinery, add many years to his life.

Although legislation can do, and has done much to protect the miner from these causes of disease, yet it is also very necessary that he should receive instruction as to the proper precautions to be taken for the preservation of his health. In Europe all mines infested with explosive gases are subjected to very strict regulations as to ventilation, and the inspectors are required to examine them constantly. This portion of the mining code should be drawn up with the greatest care.

The laws which may be classed under the third head, *i. e.*, those relating to mines as a source of national wealth, are to be found only in the codes of continental Europe. Every operator is there allowed to work his mine up to its full capacity, but he is not permitted to do so in such a way as to compromise the safety of the mine, or to destroy or render useless any ore or mineral in the deposit. This is often done; in this country, alas! it is the rule rather than the exception. Very often the richest ore only is taken out, and thousands of tons of poorer stuff, which may never again be reached, are left behind. Sometimes, in order to save expense, the timbering is made too light, and much good ore is lost by the caving in of the mine. In Europe it is the duty of the government engineers to see that no such wanton waste occurs, and to stop the mine, if that be necessary, to prevent it.

Let us now consider what should be done in this country, confining our remarks to the older States, where the general government has no interest in the land, and where the laws must be enacted by the State legislatures. We need not consider the question of the title to mines, that belonging to the province of the lawyer, as the minerals go with the surface right. We will devote our attention more particularly to the laws which may be classed under the second head. In all countries where the right to mine must be obtained from the State, the latter can impose any conditions upon the operator which it sees fit; for they are really only the terms of the lease under which the mines are worked, and the parties undertaking to open them are perfectly aware of what will be required of them before they expend any money. In this country, as in England, the government can only interfere where it is necessary to do so in order to protect the life or property of the citizen. Mining is no way different in the eyes of the law from any other industry. Although the State is bound to see that the miner is subjected to no unnecessary danger, yet it is equally its duty to protect the workmen in powder mills, the hands in factories, the passengers upon railroads, and the citizen in his home when his life is placed in jeopardy by the erection of unsafe steam boilers near his dwelling. The duty and the right of the government to interfere in all the above cases are based upon the same principles. Although there is a great and pressing need of a good, well-digested code of mining laws in this country, the method adopted at the last session of the legislature to obtain it is not, I think, the most advisable.

The subject of mining legislation is not a new one; able experts in England, France, and Germany have been studying it for many years, and it is very important for us to profit by the results of their labors. In preparing a mining law it would not be wise, I think, to base it, as has been done, upon the assumption that one class of persons to be affected by it—I mean the operators—are not to be consulted, the law being intended merely to protect the workmen from them.

In drawing up the act three parties are to be considered—the miner, the mine owner, and the general public. The first and main object of such legislation is, of course, the safety of the miner, and to this all other considerations must yield, but, at the same time, care should be taken to impose no useless restrictions upon the operators, to make the law as simple as possible, and to frame it in such a way as to prevent any feeling among those affected by its provisions, that their interests have been uselessly sacrificed.

A mining law should, if possible, be satisfactory to both workman and operator, who should feel that there was no intention to oppress either, otherwise the law will be obeyed with great reluctance; it should contain no illegal provisions, which, if contested, would be over-ruled by a court of justice. It is important to the whole country that the mines should be required to make no useless expenditures, as this will cause an increase in the cost of production of the mineral that may seriously affect those industries which are dependent upon the mines for their supplies. All such expenditures fall eventually upon the consumer, and if uselessly made through ignorance, are a national loss of labor or capital.

If a good mining code is to be enacted in any State, a commission or committee should be appointed to frame it, which should consist of, or at least have the advice of, one or more persons learned in the law, of one or more persons skilled in mining and well acquainted with the mining legislation of Europe, of one or more practical miners, who are familiar with the dangers to which they and their fellows are exposed, and who would represent those to be protected, and finally, of one or more persons interested as operators or owners of mines.

In drawing up the law, it is important that no provision should be inserted which would be declared unconstitutional by the courts. If any clause in the act were decided to be illegal, parties would be encouraged to contest some of the other provisions, and much time would be lost before it could be brought into regular operation. It would be the duty of the mining engineers to examine the mining codes of Europe, to collate all that had been done previously, and to furnish to the committee the scientific groundwork of the act. They could also give advice if a dispute arose between the representatives of the workmen and of the operators. The practical miners would call the attention of the committee to the dangers to which they were particularly exposed in the state or country in question. Each mining district has its own peculiar sources of peril: in one it is the fire-damp, in another the water, in a third the bad roof, in a fourth the great thickness of the vein, etc. These points should be carefully considered, and a man who is daily exposed to such dangers could afford much assistance to the committee in their work. The owners and operators of mines who, as in Pennsylvania, have invested hundreds of millions of dollars in purchasing, opening and improving their properties, and in building railroads for the transportation of the products of their works, should also be heard, not for the purpose of thwarting any legislation which might be necessary for the safety of the men, but to prevent the insertion of useless or oppressive provisions in the law, like some of those to be found in the act lately passed by our legislature. If all parties were heard before the bill passed finally, the law would be obeyed much more cheerfully, both in letter and spirit.

No matter how well digested the provisions of the act may be, it will always be difficult to carry them into effect, unless the persons charged with the duty of inspecting the mines are well-educated, experienced and honest mining engineers or viewers. Such officers can only be obtained by establishing good schools for civil and mining engineering. The appointments should be made by competitive examination, those showing most theoretical and practical knowledge to be chosen. There should be different grades of inspectors, so that faithful service would certainly be rewarded by promotion. All appointments should be for life or good behavior.

It is also important to provide schools for the education of working miners, in which they could be fitted for the responsible post of mine boss, as the over-man or master miner is called in this country. The course of instruction should be so arranged that the miner could, while pursuing his studies, support himself by working in the mines. He would not, of course, be able to gain as much as those not attending the school, but he could earn enough to pay his expenses. For this reason the schools for master miners should be located in the mining districts, where work could be obtained. The course of instruction should embrace the elements of geology, chemistry, and mechanics, with special instruction in mining and underground surveying. Such schools exist in many parts of Europe, and have been found to be eminently useful. Although I am not aware that the plan has ever been tried, I think that much good could be done by introducing into the common schools of the mining districts an elementary course of instruction upon the subject of mining, with special reference to the health and safety of the miner. If such provisions for the instruction of all classes of persons employed about the mines were made, one of the greatest difficulties in framing and carrying out good legislation upon mining would be removed. It is important that there should be some person or board to whom appeal could be made when disputes arise between the local inspector and the operator, and who would have the power of suspending some of the provisions of the act, or of imposing temporary restrictions upon the mines, in cases of emergency. This could be arranged by having several grades of inspectors. At present the inspector in Pennsylvania stands alone; there is no one to whom he can appeal in case of doubt, and no one whom the operator can call in if he thinks the inspector is wrong. The operator can now appeal only to a court of justice. In Europe the case is different; in England an appeal can be made to the Secretary of State, who appoints a commission to investigate the subject; on the continent the same thing is done by the higher mining officials.

It is of the very greatest importance that the men should be obliged by law to obey the orders given them in regard to mining, timbering, use of lamp, etc., by those placed over them. No law and no care of the inspectors will be of much avail if the men are at liberty to disobey the instructions given them in regard to their work, the use of their lamp, or the precautions to be taken to avoid accidents. In all the mining codes of Europe there is a provision compelling the directors of mines to adopt rules for the management of the works, and these, when approved of by the inspector, become part of the mining law, and every one employed about the mines is obliged to obey them. Unfortunately there is no such clause in the law lately adopted in Pennsylvania. Many persons have an erroneous impression that mining is a peculiar subject for legislation. In those countries where the right to mine must be obtained from the government, the latter can, of course, impose much greater restrictions upon mining than upon other industries. In this country, on the contrary, the right to mine belongs to the proprietor of the surface, and the state can only interfere when the lives or property of others are endangered, and it is then its duty to do so. The case is, however, the same with railroads and powder-mills. If it is the duty of the government, before allowing one citizen to employ men in his mine, to see that proper precautions have been taken to protect the miner not only while at work, but also in going to and returning from it, so long as he is underground, it is certainly also the duty of the state to see that the hands in factories are equally well taken care of, that they are exposed to no healthy atmosphere or danger of being injured by the machinery, and that the lives of passengers on railroads are not placed in jeopardy by unskilful engineering, by false economy in the purchase of bad rails and inferior rolling stock, and by neglecting to introduce all improvements which add to the safety of railroad travelling. The same is true of steam-boilers, when they are erected in populous districts. These matters are all placed under the surveilance of government engineers on the Continent of Europe. Human life is of equal value somewhere, and what is wanted is not simply a good mining law, but a well-educated corps of experts acting under a well-digested code, whose duty it should be to inspect all mines, manufactories, steam-boilers, and railroads, and to see that the proper precautions have in all cases been taken for the safety of life and property. Although thousands of persons have lost their lives in mines in the last twenty years, yet the number of those who have been killed and injured upon railroads or other public works is much greater. One general law could be made to comprehend all the above cases, and one corps of engineer could see that its provisions were carried out. One of the most important functions of such a corps would be to suggest modifications in the law, either for the purpose of securing greater safety for the workmen, or of relieving the various industries from useless restrictions.

They could also do much to improve civil and mining engineering, by reporting the various improvements adopted in different parts of the Old and New World in some periodical similar to the *Annales des Mines*. There should be some provision in the law to prevent persons who have not properly learned their trade from being received in the mines as miners, firemen, or machinists. In this country there is no such regulation, and incompetent workmen are often put in charge of machines or employed to do work, which they do not understand. This is a frequent cause of disaster.

The ideas which I have wished to express in the foregoing pages may be summed up as follows:

In the first place, a mining code should form but a portion of a general system of legislation for the better protection of the workmen employed in the various branches of industry. In framing such an act, the advice of able legal and scientific experts should be taken, and all parties whose lives or property are to be affected by it should be consulted, or at least afforded an opportunity of being heard.

No matter how perfect the law may be when passed, it will need constant modification as improvements are made in the different industries. It would also be necessary to have a corps of well-educated experts of several grades to superintend the execution of the law. Proper schools should be provided for their education, and they should be promoted from one grade to another for merit alone. I would also insist upon the importance of establishing schools for master miners, in which any one who works in the mines could, while supporting himself by his labor, receive sufficient instruction in his business to qualify him to direct intelligently the underground workings of a mine. I think it very advisable to instruct the pupils of the common schools of the mining districts in the general principles of what the French call the "*hygiéne des mineurs*," so that they may understand the dangers to which they will hereafter be exposed, and be able to afford relief to any one who had met with an accident In this way all those engaged in and about the mines would be able to understand the provisions of the law and to aid in carrying them out intelligently. I would also again insist upon the importance of preventing the employment of ignorant or incompetent workmen in places where their want of skill may be the cause of disaster.

DRIFTON, JEDDO P. O., PA. ECKLEY B. COXE.

New Publications.

THE PACIFIC RURAL PRESS.—This is the title of a new agricultural and home journal, the first number of which Messrs. DEWEY & Co., the publishers of the well known *Scientific Press*, propose to issue on the seventh of January next. Judging from their announcement and from their reputation as competent and painstaking journalists, we bespeak for the *Rural Press* not only a large subscription list in the far Western States, but a liberal complement of names in the East. The new journal will be a weekly of sixteen large pages, and will, we believe, contain illustrations. The subscription has been set at $4 per annum; clubs of ten, $3 each. Address DEWEY & Co., San Francisco, California.

THE ENGINEERING AND MINING JOURNAL.

CONTENTS FOR THIS WEEK.

[*Illustrated Articles are marked with an asterisk.**]

Breech-Loading Fire Arms	369	Mining Legislation	376
Professor Huxley on the Formation of Coal	369	New Publications	376
The Warson Æro—Steam-Engine	369	EDITORIALS:	
On the Examination of the Bessemer Flame with Colored Glasses and with the Spectroscope	270	American Metallurgy of Gold and Silver	378
The British Navy	270	Office of Commissioner of Patents	377
Three Different Methods of Sinking Through Running Sand	371	Lake Erie Coal Trade	378
Mining Statistics of Great Britain	372	The Future of Mining in Spain	378
MINING SUMMARY	372	The Missouri Tin Question again	378
MARKET REVIEW	374	The Marquette Iron District	378
THE SLATE TRADE	375	OFFICIAL LIST OF PATENTS	379
		Bituminous Coal Trade on Lake Erie	380
		BUSINESS AND PERSONAL	380
		Important to Inventors	380
		ADVERTISEMENTS	381

ROSSITER W. RAYMOND, Ph. D., Editor.

PUBLISHERS' ANNOUNCEMENT.

THE ENGINEERING AND MINING JOURNAL *is projected in the intent of furthering the best interests of the Engineering and Mining public, by giving wide circulation to original special contributions from the pens of the ablest men in the professions. The careful illustration of new machinery and engineering structures, together with a summary of mining news and market reports, will form a prominent feature of the publication.*

SUBSCRIPTION—**$4** *per annum in advance;* **$2 25** *or Six Months.*

ADVERTISEMENTS.—*The rates are as follows: Inside pages,* **25** *cents per line each insertion; the outside or last page,* **40** *cents per line. Payment required in advance.*

NEWS-DEALERS *will be supplied through the agency of the* AMERICAN NEWS COMPANY, *No.* 121 *Nassau street, New York City.*

COMMUNICATIONS *of all kinds should be addressed to the Publishers. The safest method of transmitting moneys is by checks, or Post-office orders, made payable to their order.*

Correspondence and general communications of a character suited to the objects of THE ENGINEERING AND MINING JOURNAL *will always be welcome.*

The Postage on THE ENGINEERING AND MINING JOURNAL *is twelve cents a year, payable quarterly, in advance, at the office where received.*

GEO. E CUMMINGS *is our Agent at Philadelphia. Office,* 429 *Chestnut street.*

WESTERN & COMPANY,
Publishers,
37 PARK ROW,
P. O. Box, 5969. NEW YORK CITY.

American Metallurgy of Gold and Silver.

IT is quite generally believed by men of science abroad, and frequently repeated by those who ought to know better at home, that we are blundering along in this country in the treatment of our gold and silver ores, totally ignorant of the experience already gained in older countries; that somebody should be sent to Europe by our Government to study the methods of gold and silver metallurgy there employed, and to enlighten us with the results.

A large class of persons, on the other hand, scout the idea of all science from Europe, and point to the fact that we already surpass every country in the world, unless it be Australia, in the completeness and economy of our gold-extraction, while all the imported processes have hitherto failed.

The truth lies between these extremes. American metallurgy is neither wholly in advance nor wholly in the rear of the same science in other nations. Out of our peculiar circumstances and conditions we have developed some distinctively American processes with which Europe cannot compete, because the experience of Europe has not led to the perfection of such devices. Thus the hydraulic system of mining, adapted to work cheaply large areas of auriferous earth, is native and peculiar to this country, and is employed on a larger scale and in greater perfection here than anywhere else. The California stamp-mill, with all its modern improvements, cannot be surpassed in the world for completeness of design and mechanical simplicity. Russia and Hungary cannot show such economical amalgamation as we do. Even in the treatment of tailings and sulphurets, we have employed and improved nearly all the European methods which our economical conditions will admit, and we have invented several of our own—such as the pan-process, the Brückner cylinder, etc., which seem to be much more promising than the plan of the eminent Professor RIVOT, which has repeatedly failed among us, and never succeeded. Again, in the treatment of silver ores, the Washoe process of pan amalgamation is an outgrowth of American necessities, a hybrid from the arrastra and the patio, original with us, and not only remarkable in itself, but capable of modifications and applications which considerably diminish the realm of smelting. The Freiberg barrel-amalgamation is indeed adopted in many places; but we have, in place of laborious roasting in reverberatories, the cylinders of BRUCKNER, and the shaft furnace of STETEFELDT, both American inventions; that is to say, the product of foreign science, stimulated and directed by actual experience in this country. All the instances just given testify that we are not without an American metallurgy. Even now, it is necessary for foreign governments to send agents here to study our methods and report at home. We know the processes of Europe better than Europe knows ours.

True, this American metallurgy which is springing up is sadly desultory, incomplete, untrained and unsystematized. Each step of progress costs more than it should. Thousands of experimenters waste their time in trying processes that have failed already, but of which they have no record. Many devices, even, that have been thoroughly tested and condemned in Europe, spring up to enjoy a flourishing though brief career among our enterprising and ingenious people, not learned in their history. But many more originate among us, and, for want of harmonious action or organization among the mining interests, they are tried here and there, and the results of each trial smothered or magnified, so that it takes much more time and money than it ought to require to produce in the public mind the notion that a particular plan is beyond doubt good or bad. To furnish a nucleus of experience and an exchange of information, to settle many important points yet mooted in our incomplete American system, to consolidate and cheapen our progress, a national school of mines seems to us to be absolutely required.

The California stamp-mill process for gold is described in a number of well-known books, perhaps most completely in that of Mr. J. ARTHUR PHILLIPS on Gold and Silver. It is admitted to be the best method thus far developed in actual practice on a large scale, for the treatment of auriferous quartz. The idea of smelting the ordinary auriferous quartz (even of low grade) has been put forward at different times by the possessors of patent fluxes; but its absurdity will appear if we reflect that every five dollars' worth of gold in a ton of quartz constitutes but one one-thousandth part of one per cent., or one one hundred-thousandth of the whole mass. To smelt auriferous quartz, therefore, is to flux and remove, practically, one hundred per cent. of quartz. The case is different when the barren material is not quartz, which needs a base before it will flux, and still more widely different where the ore contains some other useful metal beside gold, such as lead or copper, and where the gold, for some reason, escapes the stamp-process. There is a field for smelting which may become important and extensive, but it never can supersede amalgamation.

The treatment of sulphurets under the stamp-mill system has been a question of considerable difficulty. These are usually iron or copper pyrites, containing gold. The different practicable methods of treating them so as to secure the gold may be classified as follows. Concentration should in every case precede, where the amount of sulphuret is not large in proportion to the gangue:

1. Natural decomposition by time.
2. Roasting and amalgamation.
3. Pan amalgamation with chemicals.
4. Smelting.
5. Chlorination.

Of these methods the first is the cheapest, but it is not equally practicable for all varieties of pyrites. Some pyrites decompose very quickly when exposed to the weather, especially if it is from time to time drenched from a hose. In favorable localities the manufacture of copperas might be combined with the elimination of the sulphur in this way. After a suitable time the heaps of tailings could be again run through the mill, and a considerable quantity of gold extracted. This slow oxidation does not seem to produce rusty gold. In the Southern States this simple expedient was quite common thirty or forty years ago, and we have heard of instances in which the second or third milling of gold ores produced as much gold as the first.

The plan of roasting the ore to remove sulphur, and then amalgamating it, seems very rational, but it cannot yet be said to have succeeded. The roasting apparatus, invented in such abundance, has frequently been quite imperfect. In no other department of metallurgy have our inventors made such a brave show, with so little real success. Their plausible experiments turned on the fact that whatever is done to sulphurets, the first change produced is and must be a partial desulphurization. Hence the pyro-ligneous acid, the superheated steam, the cold bath, the hot bath, and numerous other fanciful inventions, comparing their results with the results of no process at all, could always claim to have desulphurized more or less of the original mineral.

But other and more scientific appliances seemed equally to fail. The reverberatory, the Gerstenhöfer terrace furnace, the Brückner cylinder, have all been tried on gold sulphurets in Colorado, though it is claimed that they have not been thoroughly tried, and that the practical success of the reverberatory and the cylinder in treating silver ores for amalgamation, promises better results than have yet been achieved with gold ores. However this may be, the fact is strongly indicated by careful experiments in San Francisco, that the roasting of auriferous sulphurets produces rusty gold, which will not amalgamate. Experiments at Central City go to show that, by the addition of salt to the roasting charges toward the end of the process, the coating of iron oxide may be converted into a chloride and removed. This expedient would probably be impossible in the Gerstenhöfer, where the addition of salt would cause the ore to cake on the terraces. Whether the Stetefeldt furnace can be adapted to such a purpose remains to be seen. This is a subject still requiring investigation; and the essential problem is not to invent a new desulphurizer, as many suppose, but to find out whether desulphurized ores can be successfully amalgamated, and if so, how.

The system of pan amalgamation with chemicals is gradually gaining ground in California. The theory of the pan process, both for gold and silver ores, has been but little understood by those who, being skillful and practical mechanics, were, in spite of their ignorance of chemistry, our best mill-men. The use of chemicals, therefore, has been largely a matter of whim or of superstition. But there is no doubt that chemical reactions, involving the decomposition of sulphurets, may be brought about in pans by using proper chemicals *in adequate quantity*. This is another direction in which quiet but highly important progress is to be expected.

Smelting is not to be employed except when base metals can be obtained as well as gold. It is one of the most complete, but at the same time one of the most expensive methods; and for a country like ours, it has the great inconvenience that it is a continual process, without pauses—in a word, without "clean-ups." It requires constant assays to control it. The only way to conduct it economically is to perpetually put back into each stage of the process certain classes of assorted semi-refuse; and thus the proceeds of each charge of ore are lost in the general average product of the works. It follows that custom work, such as the mills perform, is impossible at furnaces. They must buy ores on assay, and take their chances as to profit. This combines mercantile with metallurgical risk, and it is often the case that the proprietor of the smelting works, to protect himself, puts his price list for ores so low as to drive away customers, or, to attract customers, pays so much for ores as to ruin himself. The only way to adapt smelting to our gold and silver industry is, in our opinion, to have smelting establishments under separate administration, abundantly supplied with capital, officered with the best skill in metallurgy and business, and supported by the purchase of various ores, which, by mixture, can be made to yield their valuable contents more economically than would be possible with the product of a single mine. The success of Professor HILL in Colorado, is a comment upon this proposition.

Chlorination is a German process, introduced by the celebrated PLATTNER, Professor at Freiberg. It has, however, been considerably improved in this country, especially by Messrs. KUSTEL, DEETKEN and HOFFMANN. It is the most thorough of all gold extraction processes; but, in its ordinary application, it leaves the silver in an insoluble form in the ore. This could be extracted by subsequent leaching with hot brine, or the double-chlorination (a Hungarian process) could be employed, which gives a final solution containing the chlorides of both gold and silver. In most ores to which chlorination has been applied, however, the contents of silver are so small as to be overlooked.

The amount of sulphurets extracted in gold ores, outside of Colorado, is thus far very small. When concentrated for special treatment, they do not amount to enough, at any one mine in the country, to keep a small chlorination apparatus continually running. The sulphurets of Colorado, however, constitute in many cases the great part of the ore. They are not disseminated sparsely in quartz; hence they cannot be easily concentrated to a high value. It seems to us, therefore, that for the average grade of Colorado sulphurets, natural decomposition, or the improved pan process with chemicals, affords at present the greatest promise. The former might be tried without much expense, as many mills have saved large heaps of tailings.

From the foregoing summary it may be seen how little Europe has to do with our present stand-point in the treatment of gold ores. What she can give us is the scientific spirit and training which will construct out of the abundant materials at hand an American art of gold metallurgy.

In the treatment of silver ores, America has given birth to two most important processes, the patio and the pan amalgamation. Of these, the former is not in use in the United States, experience having shown the climate, in most of our mining districts, to be unfavorable to it. There are some, however, who still think it might be in certain localities successfully employed. The pan amalgamation is the so-called Washoe process, and consists in passing the pulp from the stamp-batteries into pans, where it is stirred or ground, together with quicksilver, and sometimes with chemicals, especially copper-vitriol, and salt. The practices of mill-men continue to differ widely, and many points of vital interest and importance remain as much unexplained as ever. Two improvements are, however, unquestionable. The first is the increase in the size of the pans; and the second is the adaptation of the Washoe process to refractory ores by means of chemicals in the pans.

The Freiberg process, as it is called in this country, consists in the roasting of refractory ores with salt and their subsequent amalgamation. The amalgamation is generally carried on in pans, whereas the true Freiberg method employs barrels. The dispute between the advocates of the two kinds of amalgamation is not yet settled.

The manner of performing the preparatory chloridizing roasting is a matter of great importance. This is the most expensive part of the treatment, and the rapid disappearance of fuel in the silver-mining districts renders economy in that item highly desirable. It is here that the Bruckner cylinders and the Stetefeldt furnace have found their field of usefulness hitherto; and if they accomplish no more than they have done already, they will justify us in claiming for America the most valuable contributions that have been made to the metallurgy of silver in the last five years.

Office of Commissioner of Patents.

THIS office has recently become vacant in consequence of the resignation of Commissioner S. S. FISHER, who, as we are informed, returns again to the practice of his profession in Cincinnati. Several prominent individuals are named to fill this vacancy, but who will receive the appointment remains to be seen. The present assistant, and now acting Commissioner, Mr. SAMUEL A. DUNCAN, has our preferences. We believe him to be cautious and just in all his decisions, and from his knowledge and experience in the office, through the administrations of different Commissioners, eminently qualified for the discharge of its executive duties.

The Patent Office is now brought to such a perfect working system that long delays seldom occur in properly-prepared cases in any class of inventions. From the most favorable expressions of many connected with the office, there is no doubt but the appointment would be satisfactory in that direction, as well as to solicitors and attorneys doing business with the office. In the event of General DUNCAN'S appointment to the position of Commissioner of Patents, the rules and regulations of the office now in force would no doubt remain substantially the same. Heretofore it has been customary for every new Commissioner to revise and modify the existing rules as seemed best to him for the administration of the office. Probably this would be the case in the present instance, if any outsider were

to receive the appointment, which, so far as our experience is concerned, greatly retards business until the employees and attorneys become fully posted with reference to the new rules. By the time that all interested have become familiar with the workings of the office, another change is usually made, frequently from purely political motives. But this is a department that rightfully belongs to inventors, and is supported by them; therefore we do not think it just that this office should be reached by any political influence. When a man of integrity and the requisite ability is found in this position, he should be allowed to remain there, regardless of political considerations. The same principle will apply with equal force to the examining corps.

A new examiner, whatever his qualifications and ability may be, must necessarily spend considerable time in becoming thoroughly conversant with the duties of his office. After he has acquired the requisite knowledge and facility, he should not, in our opinion, be removed without just cause. If he is, he must be replaced by a new man, and the business of the office must be allowed to drag along until the new recipient of Patent Office honors has been "broken in," inventors, the Government, and the public generally necessarily, suffering from the change.

Lake Erie Coal Trade.

IN another column will be found a communication giving such information on this subject as was collected and arranged by our correspondent, "C. W.," of Cleveland, Ohio. It will be observed that the data are more complete for Cleveland than for any other of the shipping ports on the lake. We are fully convinced that this trade, which has already acquired considerable national importance, is destined, in the immediate future, to a much greater development. On this account we would be glad to receive data from Erie and the other ports, so as to enable us to lay before our readers a complete statement of the whole matter.

The Future of Mining in Spain.—No. I.

SIR: I have not been able as yet to fulfil the promise made to you before my departure for this country—that of forwarding you some information with reference to mining matters. The first month I employed in visiting the various mining districts of the Province of Teruel, Aragon. Some of these are situated in the high ranges of mountains called Sierra de Albaracin, from the town of the same name, once inhabited by the Moors. The geological formation of these high ranges belongs to the Lower Silurian, and the minerals which exist there are composed mostly of grey copper ores, with a high percentage of silver, averaging from forty to one hundred and fifty ounces per ton. In one of these veins I found bismuth, and Mr. THOMAS SEWELL is now engaged in the investigation of this lode and other lodes, and, no doubt, ere long we shall hear of some discovery of this metal being made, which may induce the promoters to continue their researches. The mine called Zarzosa, belonging to DON MANUEL LANZAROTE, which produces grey copper of 25 per cent., and 100 ozs. of silver, promises to become of some importance. Not far from Teruel we have also very rich manganese beds, averaging from 70 to 80 per cent. But the freight to the port of shipment (Valencia) is about £1 16s., and, at the present price of this metal in England, no shipments can be made. The beds average from three to eight metres in thickness. I will refer in future letters to their geological position. We have also the native sulphur seams, about twenty miles south-east of Teruel. These mines have been worked for half a century, and their produce finds a ready sale in Madrid and other towns of the interior, and is mostly employed in destroying the oidium, a cryptogamous plant, which attacks vineyards with tenacity. I have collected some most curious specimens, in a Palæontological point of view, for our Mining College in Jermyn street; and these consist of fossil sulphur, in the shape of Planorbis and Lymnea. These are fresh water species, belonging to the Miocene period, proving thereby that these beds were impregnated with solutions of sulphur at a very recent date, comparatively speaking. On my arrival in Madrid I was introduced to Mr. CHAS. Ross, who has lately purchased from the Spanish Government the native sulphur mines of Hellin, in the Province of Murcia, and these mines very lately have received a most important addition to their value. The railway to the port of Carthagena passes only one mile from them, and the freight per ton to the port of Carthagena is 6s. These are the same class of native sulphur seams as those in the Province of Teruel, with the exception that no sulphur fossils are found in these; nor have I found any anywhere in my travels, except in the sulphur mines of Libros, near Teruel. I was requested by Mr. CHAS. Ross to accompany him to the Hellin mines, where he has established the Sicilian process for smelting these ores, a patent granted to the writer, in 1863, by the Spanish Government.

I will give you a description of this process in some future letter. It consists in using part of the sulphur, three per cent. of the ore, as combustible for extracting the rest. I left the Hellin mines, and travelled as far as Alcanzas; there I took the train to Ciudad Real and Almadenejos, which is the railway station of the celebrated Almaden mines, and about four miles distant from them. Persons desirous of visiting these most important mines should be made aware that, although there is a station called Almaden, some miles after passing Almadenejos, at this station there is no class of conveyance to these mines. The writer became aware of this fact most tangibly and practically, for he had to walk seven miles in a broiling sun, accompanied by a guide, leaving baggage at the Almaden station, to be sent back to the Almadenejos station, and to the town of Almaden. In my next I will forward you my impressions on visiting these mines, and their metallurgical department. It is certainly wonderful in how short a space of time railways have placed so many mineral districts within easy reach of the traveller in this country. The celebrated coal mines of Belmez and Espiel, placed now in connection with railways, are supplying by degrees all these localities with coals, and stacks are gradually appearing in these mining localities. No doubt good times for mining enterprise are coming for old Spain. HENRY SEWELL.

ALMADEN QUICKSILVER MINES, Oct. 30.—*London Mining Journal.*

Coal Mining in India.

WE take the following interesting comparison of the strength and ability of English and Indian miners from a communication by an East India engineer to the English *Colliery Guardian*: In attempting any comparison of the amount of work done by British coal miners with what is effected by Indian ones, a few points present themselves for consideration, apart from which the general question would not be clearly comprehended by those unacquainted with the special and peculiar conditions of mines and miners in both Britain and India. The principal of these are: the average personal physical strength and endurance of the workmen; climatical conditions; and individual dexterity and skill. The Indian miner is unequal to the muscular effort of his Western brethren of toil; nor do I think can he endure excessive exertion for the same length of time. From my own experience with laborers (coolies) of India, I am of opinion that one British workman, of average strength and energy, is equal to from 2-5 to 3 of the average Indian. This difference in muscularity arises from social causes, which I need not attempt to explain here, and is also, in some measure, attributable to dietary customs, and to muscular development by habitual energy and industry. The climate of India is, however, an unsuitable one for the British or European laborer; it enervates his frame, and makes any continuous animal exertion on his part impracticable, and, indeed, perilous to health and life. I mean, when the exertion called for is of the vigorous and severe kind to which coal hewers in British coal mines are accustomed. We cannot, therefore, make a fair comparison of efficiency of British and Indian colliers, by estimating their work in an Indian climate, any more than I suspect could be done by estimating their work in a British climate; but we must speak of the Indians in India, and the British in Britain. The British collier knows well how to work so as to reap every available advantage from "points" and "backs." He prides himself on his knowledge of how to make "'vantage" for the progress of his work; his nicking and curving, drilling, blasting and wedging, are all done by rules established through his own experience and observation, and he is generally as familiar with the exact weight and shape of his tools as is his "gude" wife with her ordinary routine of domestic duties. The same cannot be said of the Indian miner: it seems to matter not to him how he leaves his place of work one day, or how he finds it the next. "Let the morrow take thought for itself" might be taken as his leading motive; and battering away against the coal-face with his pointed crowbar, in a hit-or-miss fashion, appears the only systemless mode of work he is capable of pursuing.

In most of the coal mines in India at present in operation the coal seams are upwards of five feet in height. Many of them are eight to nine feet, and some thirty feet high. In Bengal the price paid for hewing coal and carrying it to the pit bottom is ten pence and one-eighth of a penny per ton. As the pits are shallow, and, consequently, numerous, the distance which the coal has to be carried seldom exceeds five hundred feet, and the carriage is done by women and children in baskets borne on their heads. In the central provinces of India, from which part I write this, and where coal mining is simply in its initial step, we have hitherto been unable to induce the natives to enter upon any kind of contract work for coal-hewing, and at daily wages the coal is costing from three to four times ten pence and one-eighth of a penny per ton (the Bengal price) for hewing alone. In Bengal, the out-turn per man per day, of large and small coal, is about twelve maunds, of twenty-seven maunds to one ton. The earning per day is, therefore, about four pence half-penny per man, and out of this the carriage of the coal, from the working coal-face to the bottom of the pit, has to be paid. Here, in the Central Provinces, five annas per day are given to the coal hewers, and they have never yet exceeded an out-put of eight maunds per man per day, of large and small coal, which is equal to a cost of 2s. 1½d. per ton. Food is dearer here than in Bengal, and living, generally, more expensive; hence, whereas the Bengal miner receives 4½d. per day, and out of this has to pay his coal carrier, the miner here receives 7½d. without drawbacks. Were these coal seams in Britain instead of in India, there would easily be obtained from the Bengal seams an out-turn of about six tons per man, and from the Chanda seams, Central Provinces, about four tons per man; or, in other words, if the seams were in Britain, or a British climate, and worked by British miners, the amount of work done in them would be from thirteen to fourteen times the amount of work now being done in them in India. The purpose I have in view in making this communication is to show to the readers of the *Colliery Guardian* how much some kind of coal-cutting machines is required in Indian coal mining. Here is a much wider margin for the demonstration of great economy by such machines than is to be met with at home. I believe there is at present in operation, in English coal mines, a manual machine for coal hewing. It is some contrivance of this kind which will suit us much better in India than any kind of extensive machinery. Here labor is much cheaper than in Britain, and machinery much dearer, and the facilities for repairing machinery are, moreover, in India nothing like so good as in Britain. What we require in coal hewing in Indian mines, therefore, is a means of applying the cheap labor in a more efficient manner than in the ordinary way, by pick, drill, or crowbar, and in a manner which will not involve the necessity for expensive and complicated machinery, even should considerable efficiency be sacrificed to simplicity and durability.

CHANDA CENTRAL PROVINCES, INDIA, Oct., 1870.

The Missouri Tin Question Again.

OUR readers will probably remember an article which appeared some time since in our columns, giving an account of an excursion of capitalists to the celebrated tin mines of Missouri. It will be remembered that the assayers of the tin company made their tests in the presence of these gentlemen, and proved to their entire satisfaction that the specimens, taken at random from different parts of the mine, yielded in some cases as high as ten per cent. of the valuable metal tin. Similar specimens, when subjected to careful analysis by competent chemists, either entirely failed to show any trace of tin, or contained it in so small quantities that the idea of opening a tin mine to get out such ore would be simply preposterous. The following short letter to the editor of the U. S. *Railroad and Mining Register*, of Philadelphia, explains the discrepancy in the results in a very few words. We hope that this will be considered conclusive, and that we shall hear no more concerning this subject for some time to come:

PHILADELPHIA, November 27, 1870.

PROF. J. P. LESLEY—DEAR SIR: A few days ago I received from my friend, Mr. J. L. KLEINSCHMIDT, of Hopewell furnace, Missouri, the following highly interesting communication with reference to the "Missouri Tin" question:

Mr. THEODORE KALB, an apothecary in St. Louis, who has been one of the scientific committee which made those celebrated assays of the tin ores, taken indiscriminately at the mines, and yielding from 7 to 10 per cent. of tin, which result satisfied the committee and the rest of the excursionists of the enormous value of said mines, had, in order to convince Mr. KLEINSCHMIDT, sent him a specimen of the same ore. Mr. C. tested it exactly in the same manner and with exactly the same result as the committee, viz.: he obtained a metallic button and grains of a slight malleability. Mr. K., however, not satisfied that they were tin, made a fuller examination. He dissolved them in chlorhydric acid, and found that the solution did not give any precipitate with sulphydric acid; in fact, that they contained not a trace of tin, and were nothing else but a slightly carbonaceous metallic iron, reduced from the ferruginous silicates of the rock.

This gives this affair a somewhat different feature, though the result remains the same. I am informed that all the shares of the company had been subscribed in three days, and that over $40,000 have already been paid in. The result of Mr. K.'s examination is probably not yet known in St. Louis, but I hasten to send it to you, as it must be highly interesting to yourself and the readers of your valuable paper. Our efforts to place this whole matter in its true light from the beginning may have, I hope, prevented any of our fellow-citizens from investing money in a worthless enterprise, and of becoming the victims of such great ignorance.

Yours very truly, F. A. GENTH.

The Marquette Iron District.

THE following article from the *Marquette Mining Journal* shows very forcibly the growing importance of our Western iron districts. Although the article refers more particularly to the oldest mine in the district, the general tenor of the letter would seem to indicate that the other mines of the district are also in a prosperous condition: "A few more weeks at the farthest will end the shipping season for 1870, and as is our custom, we shall review at length the mining operations of the year, giving so far as we are able to obtain them, all the facts and figures that are likely to be of interest to our readers. By way of preface, we will simply remark that the season has been wholly favorable to the successful working of the mines—that mining operations have been prosecuted with the utmost vigor, and that the figures, which cannot be accurately given under a month to come, will show a most gratifying increase in the production of the district. These facts must be apparent to the regular readers of the *Mining Journal*, and we shall therefore proceed at once to a brief review of the year's operations at the Jackson Mine, which was the first opened in the district. The first shipments from the Jackson were made in 1856, though about 25,000 tons had been mined and disposed of to the forges, previous to that date. The following table shows the production of the mine for the fourteen years ending with 1869:

Year.	Gross tons.
1856	5,000
1857	14,000
1858	12,500
1859	10,500
1860	41,000
1861	13,000
1862	43,000
1863	61,000
1864	69,000
1865	55,000
1866	87,930
1867	126,390
1868	131,700
1869	128,240
Previous to 1856	25,000
Total	823,260

The shipments for 1870 up to the 11th inst., are given as follows:

	Gross tons.
To lower lake ports	94,267
To Jackson furnace	13,843
Total	108,110

To which should be added the product of the Pioneer Mine, owned by the same company, but worked by the Iron Cliffs Company, under a lease. The product of the Pioneer, together with shipments yet to be made, will, we think, raise the total figures to nearly, if not quite 135,000 gross tons—making a grand total of nearly one million tons in fifteen years.

We noticed, during a recent visit to the mine, many new improvements made during the past year, in the way of new buildings and mining machinery, all calculated to facilitate operations and reduce the cost of mining.

Going first into No. 1 opening, we found a new skip at work on an incline, operated by the mill engine. Last year the ore was raised from this cut in cars running on the incline, but as a greater depth was attained the old plan was found to be impracticable, and a skip was substituted. The skip is also used for raising water. A new pump will be put in soon, the bottom being very wet, and the flow of water such that only nitro

glycerine can be used in blasting. The cut is now down about fifty feet below the first level, and the ore is holding out full as well as anticipated. A vein of good ore seems to be making off to the westward, and can be very easily mined from the cut.

No. 2 is also being supplied with an incline and skip similar to that in No. 1, which will be operated by the same engine, a wire rope 600 feet in length being required for the purpose. This incline is situated at the east end of the opening, where there is a large body of ore dipping under the hanging wall on the north side of the cut. The branch tunnel is now completed into the west end of the same opening, and all the ore adjacent is taken out through it. At present the men are stoping round a horse of rock near the end of the branch tunnel, with a view to reaching a large deposit of ore beyond it. The ore mined in this part of the cut, and in fact in nearly all the openings, is loaded directly into the cars. This opening has yielded about 2,000 tons per month during the year.

The next opening we visited is what is termed "the new discovery," a large deposit of soft hematite, of which nothing was known two years ago. This deposit is being worked from the level of the branch tunnel leading into No. 2. The ore is easily mined, and contributes about 1,500 tons per month to the product of the mine.

In No. 5 there is a good show of ore, which is also being worked on the tunnel level, yielding about 3,000 tons per month.

No. 6 is near the south end of the main tunnel, and has lately been supplied with new machinery for pumping and hoisting. The engine-house is situated on the hill, and contains two fifty-horse power boilers of Root's patent, manufactured in New York. The engine now in use is only being temporartly used, and will be replaced by two new ones of 140-horse power, in the spring. The necessity for this machinery is found in the fact that the mine is now being worked below the tunnel level, to a depth of forty feet. In the first instance a shaft was sunk from the top of the hill to the tunnel, connecting with the latter, and now that the ore is pretty nearly worked out above the tunnel, the shaft has been carried down forty feet further, and hoisting machinery introduced for the purpose of raising the ore to the tunnel level. From the bottom of this shaft a drift has been pushed westward 100 feet to the bottom of another shaft of the same depth, in No. 4. No. 4 is opened out to the tunnel level, and the shaft referred to is down forty feet below the tunnel. From the bottom of this shaft another drift has been commenced along the south side of the vein, and will be carried 180 feet to still another shaft of the same depth. Work in this drift is progressing from both ends, and will be completed during the winter. After this winter all the ore mined in Nos. 4 and 6 will be raised by the same machinery, except that from a deposit thirty feet wide and eighty feet in depth above the tunnel, at the east end of No. 6. It will require two or three years to work this last named deposit down to the tunnel level. The ore raised by this machinery is hoisted about twenty feet above the tunnel in a self-acting skip, and emptied into pockets, from whence it is readily loaded into the cars ready for shipment. The pump in use is one of D. H. MERRITT'S improved plungers, which works to a charm. This pump is worth an examination by mining agents generally, being pronounced by Captain MERRY preferable to any he has ever used.

In No. 8 a shaft is down ninety feet, all the way in ore. A drift sixteen feet in a north-east direction also passes through pure ore. This opening will not be mined to any extent until reached by the branch tunnel now in progress from No. 6.

South of the new engine-house a shaft has been sunk on a small outcrop to a depth of ninety feet, about two-thirds of the way through ore. This shaft also connects with the tunnel, the ore at the bottom being lean and mixed with rock. About forty feet from the top the ore appears to spread, and a good quality of ore—about 3,000 tons—has been stoped out. The blast throws the ore to the bottom of the shaft, breaking it up fine enough for shipment.

In No. 3 very little has been done this year, though a force of miners are now at work stoping down the west side. A pair of small engines will be put in this winter, to be used in sinking, it being the intention to work the cut for all it is worth hereafter.

No. 7 is now supplied with a double engine—8x12 cylinders—together with hoisting and pumping machinery, sufficient to work the mine for many years to come. A shaft has been sunk forty feet through at the west end, from which a drift is being driven towards the ore. The ore is raised in small hoppet cars, on an incline, and pass directly over the engine house into pockets over the railway. The miners are now taking up the old hematite bottom—a very fine ore—the best of the kind in the district.

No new discoveries are reported except one a short distance south of No. 2, where a number of test pits reveal a large deposit of ore similar to that now being worked on the Pendill farm. It is probably continuous with the Pendill ore, and will no doubt prove valuable.

Nothing is being done north of the railway where large deposits of hematite are known to exist.

A few years ago nearly all the ore mined at the Jackson was loaded into carts and hauled to the cars or stock pile; now the system of drifts, tunnels and machinery, introduced and completed, so far economizes the cost of mining that nine-tenths of the ore mined is loaded directly into the cars, and horses and carts are at a discount. The company has two small locomotives for use in the tunnels, and the system of underground work is so far perfect that the cars are run into nearly all the openings. The cost of mining and loading the ore must, therefore, necessarily be much less than in former years.

Another plan adopted by the management is worthy of note. During the winter months work is principally confined to the removal of waste rock, and in preparing the mines for active mining operations in the spring. By this means a great deal of labor in rehandling the ore after it goes into the stock pile is saved. Of the 120,000 gross tons mined by the company this year, it is safe to say that at least 100,000 tons are loaded by the miners directly into the cars for shipment. It is a plan that might be adopted with great advantage at other mines.

The average force employed at the mine the past season was about 220 mechanics, miners and laborers. The company own about 55 buildings of all kinds, while a large number of buildings in the village of Negaunee are situated upon company lots.

Altogether the Jackson is in the best possible condition for future mining operations, and will have no difficulty in keeping her product up to the figures of the past two years, while she can easily improve upon them should circumstances require it.

OFFICIAL LIST OF PATENTS.

Issued by the United States Patent Office.

FOR THE WEEK ENDING DECEMBER 6, 1870.

Reported Officially for the Engineering and Mining Journal.

SCHEDULE OF PATENT OFFICE FEES

On each caveat	$10
On filing each application for a Patent (seventeen years)	15
On issuing each original Patent	20
On appeal to Commissioner of Patents	20
On application for Reissue	30
On application for Extension of Patent	50
On granting the Extension	50
On filing a Disclaimer	10
On an application for Design (three and a half years)	10
On an application for Design (seven years)	10
On an application for Design (fourteen years)	30
Registration fees for TRADE MARKS under the new law; for thirty years	25

Citizens of Canada can now obtain Patents in the United States upon the same terms as Citizens of other Countries.

For copy of Claim of any Patent issued within 30 years	$1
A sketch from the model or drawing, relating to such portion of a machine as the Claim covers, from upward, but usually at the price above named	$1
The full Specifications of any patent issued since Nov. 20, 1866, at which time the Patent Office commenced printing them	$1 25

Official Copies of Drawings of any patent issued since 1836, we can supply at a reasonable cost, the price depending upon the amount of labor involved and the number of views.

Full information, as to price of drawings, in each case may be had by addressing

WESTERN & CO.,
No. 37 Park Row, New York.
CHARLES ROGERS, Solicitor.

109,793.—KNITTING-MACHINE AND NEEDLES.—Austin W. Allen, Indianapolis, Ind.

109,794.—CLOTH-WINDING MECHANISM FOR LOOMS.—William A. Arnold, Rockport, Mass.

109,795.—LUBRICATOR.—Charles Dudley Austin, Newcastle-on-Tyne, England.

109,796.—VALVE-COCK.—Ralph Berryman, Boston, Mass.

109,797.—CAR-COUPLING.—Henry Blanchard, Jr., Boston, Mass.

109,798.—BELT-FASTENER.—Samuel S. Bolton, Big Rapids, Mich.

109,799.—BEDSTEAD-JOINT.—Lewis G. Bradford, Plymouth, Mass., assignor to himself and Nathaniel H. Morton, same place.

109,800.—CURTAIN-FIXTURE.—John G. Brothwell, Wolcottville, Conn., assignor to Turner, Seymour & Judds, same place.

109,801.—SASH-LOCK.—Erastus L. Brown, Norwich, N. Y.

109,802.—APPARATUS FOR EVAPORATING BRINE AND OTHER LIQUIDS.—James Buchanan, Detroit, Mich.

109,803.—BRICK-MACHINE.—Cyrus Chambers, Jr., Philadelphia, Pa.

109,804.—COTTON-BALE TIE.—William Chambers, New Orleans, La.

109,805.—TINSMITHS' FURNACE.—Michael Conner, Plymouth, Mich.

109,806.—CIRCULAR-SAW JOINTER.—Elijah H. Corbin, Winchester, Ind.

109,807.—STEAM-GENERATOR.—Leffert Ryerson Cornell, Flatbush, N. Y.

109,808.—RAILWAY RECLINING-CHAIR.—John P. Curry, New York, N. Y.

109,809, antedated November 26, 1870.—NUT-LOCK.—Milo A. Cushing and Otis R. Glover, Ottawa, Ill.

109,810.—WASHING-MACHINE.—Henry Dickinson, Marlborough, Conn.

109,811.—REFRIGERATOR.—Hermann F. Eberts, Detroit, Mich., assignor to himself, Daniel Y. Howell, Toledo, Ohio, and Thomas S. Sprague, Detroit, Mich

109 812.—CULTIVATOR.—Abraham Eshleman, Martinsville, Pa.

109,813.—BARREL SAFETY-VALVE OR VENT.—Benjamin Franklin Evans, Newburyport, Mass.

109,814.—HAND-STAMP.—Daniel W. Fish, Brooklyn, N. Y.

109,815.—PERPETUAL BRICK-BURNING KILN.—William Gilbert, Detroit, Mich.

109,816, antedated November 25, 1870.—SEWING-MACHINE FOR MAKING PUFFINGS.—Edward D. Gird, Syracuse, N. Y.

109,817.—WAGON-TONGUE SUPPORT.—Albert F. Gue, Eastmanville, Mich.

109,818.—SHUTTER-FASTENER.—Theodore Hair and Jas. Wood, Norristown, Pa.

109,819.—SNOW-PLOW.—Cornelius F. Hornbeck and William J. Carns, Slaterville, N. Y.

109,820.—DEVICE FOR FREEZING FISH, MEATS, &c.—Daniel Y. Howell, Toledo, Ohio, assignor to himself, Thomas S. Sprague and Hermann F. Eberts, Detroit, Mich.

109,821.—BOX FOR PACKING FRUIT, PROVISIONS, &c.—George M. Huston, Putnam, Ohio.

109,822.—FEED-CUTTER.—William Hutchins, Paw Paw, Mich., assignor to himself and George G. Hutchins, same place.

109,823.—HEAD-REST FOR CAR-SEATS.—Edward M. Judd, New Haven, Conn.

109,824.—JELLY-GLASS.—William M. Kirchner, Pittsburg, Pa.

109,825.—TOOL FOR FORMING SCREW-THREADS ON GLASS JARS.—William M. Kirchner, Pittsburg, Pa.

109,826.—HAIR-SPRING OF WATCHES, &c.—Calvin Kline, Brooklyn, N. Y., assignor to himself and George E. Hart, Newark, N. J.

109,827.—POCKET-BOOK.—Julius Lehman, New York, N. Y.

109,828.—SEWING-MACHINE.—T. A. Macaulay, Northampton, Mass.

109,829.—STEAM-BOILER.—William B. Mack, Detroit, Mich., assignor to Divie Bethune Duffield, same place.

109,830.—CAR-COUPLING.—Stephen Mahurin, Liberty, assignor to himself, James W. Singleton, and William A. Richardson, Quincy, Ill.

109,831.—SAUSAGE-STUFFER.—Jacob Mickley and John E. Hartman, Cashtown, Pa.

109,832.—WAGON-BRAKE.—Jacob Mickley and John E. Hartman, Cashtown, Pa.

109,833.—VARNISH FOR PHOTOGRAPHIC NEGATIVES.—John Wolfgang Morgancier, Sheboygan, Wis.

109,834.—DOOR-LATCH.—Wallace T. Munger, New Britain, Conn., assignor to P. & F. Corbin, same place.

109,835.—TREADLE FOR SEWING-MACHINES.—Alfred Nielson, Brooklyn, N. Y.

109,836.—WASHING-MACHINE.—Luke B. Osgood, Shelby, Mich.

109,837.—CORN-PLANTER.—Geo. Paddington, Waubeck, Iowa.

109,838.—STOVE-PIPE THIMBLE.—James D. Pierce and John B. Smith, Milwaukee, Wis.

109,839.—GRAIN-SEPARATOR.—Hiram Raymond, Tecumseh, Mich.

109,840.—WASHING-MACHINE.—John G. Raymond, Rondout, N. Y.

109,841, antedated November 30, 1870.—BUR-MILL.—Samuel G. Rollins, Boston, Mass., assignor to Wigg, Rollins & Co., same place.

109,842.—CARRIAGE-AXLE AND AXLE-YOKE.—Samuel Rowell, Amesbury, Mass.

109,843.—WAGON-BRAKE.—Geo. W. Sanborn, Gilmanton, N. H.

109,844.—MACHINE FOR STAMPING, PRESSING AND POINTING HORSESHOE NAILS.—Frederick Sandham, Montreal, Canada.

109,845, antedated November 26, 1870.—LAST FOR BOOTS AND SHOES.—Samuel W. Shorey, Chicago, Ill.

109,846.—SHAFT-COUPLING.—William Smeed, Rochester, assignor to himself and Glen & Hall Manufacturing Company, Brighton, N. Y.

109,847.—MILKING-STOOL.—George Smith, Syracuse, N. Y.

109,848.—APPARATUS FOR THE MANUFACTURE OF GAS FROM HYDROCARBONS.—James H. Smith, Newark, Ohio.

109,849.—BUCKLE.—George E. Stedman, Boston, Mass.

109,850.—PILE FOR BEAMS.—Joseph Stokes, Trenton, N. J.

109,851.—MACHINE FOR COUNTERSINKING THE HOLES IN BUTT-HINGES.—Lucius P. Summers, New Britain, Conn., assignor to P. & F. Corbin, same place.

109,852.—BED-BOTTOM.—Charles Valkmar, New York, N. Y.

109,853.—SUSPENDER.—Joseph Warren Wattles, Canton, Mass.

109,854.—MACHINE FOR TRUSSING BARRELS.—Peter Welch, St. Louis, Mo.

109,855.—SPRING HINGE.—William Wells, Cleveland, assignor to himself and John Wrigleworth, Mentor, Ohio.

109,856.—LANTERN.—Hiram Jacob White, Boston, Mass.

109,857.—PROCESS OF SEPARATING THE HAIR FROM THE WARP IN HAIR-CLOTH.—David Whiteley, Providence, R. I.

109,858.—WIRE-FENCE.—Bartholomew Wilson and Franklin P Grimes, Dayton, Ohio.

109,859.—TREE-PROTECTOR.—Blaney L. Alley, Salem, and Thos. W. Shapleigh, Cambridgeport, Mass.

109,860.—CLOTHES-DRIER.—Chas. L. Anderson, St. Louis, Mo.

109,861, antedated December 3, 1870.—CORPSE-PRESERVER.—R. C. Andrus, Poughkeepsie, N. Y.

109,862.—DRAIN-TILE MACHINE.—Henry F. Baker, Centreville, Ind.

109,863.—HAY-TEDDER.—Orville A. Benton, Amenta, N. Y.

109,864.—ATTACHING LAMP-FOUNTS TO BRACKETS, CHANDELIERS, &c.—George Bohner, Chicago, Ill.

109,865.—APPARATUS FOR CLEANING AND POLISHING COFFEE.—James H. Brookmire, St Louis, Mo.

109,866.—FRICTION-ROLLER.—Wm. Brown, Portsmouth, England.

109,867, antedated November 25, 1870.—ICE-AX AND PICK.—John N. Bunnell, Unionville, Conn.

109,868, antedated November 26, 1870.—COMBINED RULE, BEVEL, SQUARE, AND DIVIDER.—George G. Burgess, Grafton, Ohio.

109,869.—INSECT-DESTROYER.—Thos. Byrne, New York, N. Y., and Diedrich Strunk, Lavaca county, assignors to themselves and to J. J. Schott, Lavaca county, Texas.

109,870, antedated November 30, 1870.—JOURNAL-LUBRICATOR.—James A. Cowles, Chicago, Ill.

109,871.—BUCKLE.—Lorenzo Dow Cowles, Romeo, Mich.

109,872.—SEASONING AND PRESERVING WOOD.—Charles Massey Cresson, Philadelphia, Pa., assignor to American Wood Protection Company.

109,873.—SEASONING AND PRESERVING WOOD.—Charles Massey Cresson, Philadelphia, Pa., assignor to American Wood Protection Company.

109,874.—TREATING AND RECOVERING THE LIQUIDS USED IN SEASONING AND PRESERVING WOOD.—Charles M. Cresson, Philadelphia, Pa. assignor to American Wood Protection Company.

109,875.—BREAD-PAN.—William H. Daggett, South Vineland, N. J.

109,876.—FOLDING-CHAIR.—Isaac J. Dann, New Haven, Conn., assignor to the New Haven Folding-Chair Company, same place.

109,877, antedated November 23, 1870.—LOCOMOTIVE HEAD-LIGHT.—Samuel M. Davies, Chicago, Ill.

109,878.—ROTARY ENGINE.—William A. Davis, Salem, Ohio.

109,879.—INSULATOR FOR TELEGRAPH-WIRES.—Manuel De Montufar, New York, N. Y.

109,880.—CASING TS FOR OIL-WELLS.—Julius Dickey, Titusville, Pa.

109,881.—PROCESS FOR MAKING CONCAVE CIRCULAR SAWS.—Thomas S. Disston, Philadelphia, Pa, assignor to himself and Henry Disston & Son, same place.

109,882.—POST-MARKING STAMP-CANCELLING MACHINE.—Charles E. Donnellan, Indianapolis, Ind, assignor to himself and McCord and Wheatley, same place.

109,883.—STEAM-BOILER.—George S. Dubois, Jersey City, N. J.

109,884.—HARNESS-OPERATING MECHANISM FOR LOOMS.—John C. Duckworth, Pittsfield, Mass.

109,885, antedated November 26, 1870.—WATER-WHEEL.—William H. Elmer, Berlin, Wis.

109,886.—IRON CULVERT.—Moody G. Freeman, Wenona, Ill.

109,887.—SACCHARIFYING MASH FOR GRAIN.—Charles H. Frings, Centreton, Mo, assignor to himself and Charles Braches, same place.

109,888.—BEE-HIVE.—James W. Gladding, Normal, Ill.

109,889.—SPRING BED-BOTTOM.—Chas. Glenn, Allegheny City, Pa.

109,890.—BREECH-LOADING FIRE-ARM.—Charles Green, Rochester, N.Y., assignor to Charles Parker, Meriden, Conn.

109,891.—WATER-WHEEL.—Mahlon Gregg, Rochester, N. Y.

109,892.—WINDOW-FRAME.—William H. Griffin, Springfield, Mass.

109,893.—COTTON-PLOW.—Thos. Guice, Mount Andrew, Ala.

109,894.—MOLD AND CONE FOR METALLIC CASTINGS.—William Heinsworth, Allegheny, Pa.

109,895.—MEDICAL COMPOUND.—Orrin F. Harris, Norwich, Conn.

109,896.—PUMP.—William Hartley, Durand, Ill.

109,897.—COTTON-PRESS.—William Haynie, Memphis, Tenn.

109,898.—COLLAR FOR CIRCULAR SAWS.—James B. Heald, Milford, N. H.

109,899.—CANAL LOCK.—George Heath, Annapolis, Md.

109,900.—SAWING-MACHINE.—Daniel Heller, Milton Centre, Ohio.

109,901.—COFFEE-POT.—Louis Hildenbrand, Michigan City, Ind.

109,902.—FAUCET.—Jacob Hills, Haydensville, Mass.

109,903, antedated November 26, 1870.—MACHINE FOR BEATING AND CLEANING HAIR.—George P. Halloway and William J. Hussey, Portland, Ind.

109,904.—DIRECT-ACTING STEAM-ENGINE.—Wm. Davis Hooker, San Francisco, Cal.

109,905.—HAY-PRESS.—Henry C. Hunt, Indianapolis, Ind.

109,906.—STOP-VALVE.—Charles Emery Hutson, Commerce, Mo.

109,907.—TIRE FOR TRACTION-ENGINES.—Oliver Hyde, Oakland, Cal.

109,908.—LUBRICATOR FOR STEAM-ENGINES.—Francis Jackson, Wigan, assignor to William Prosser, Manchester, England.

109,909.—BASE-BURNING FIRE-PLACE HEATER.—Julius Jaeger, Tompkinsville, N. Y.

109,910.—SEWING-MACHINE.—Per Johnson, Columbia, Cal.

109,911.—WIND-WHEEL.—John H. Kimble, Samuel Kimble and George W. Kimble, Fox Lake, Wis.

109,912.—LATHE.—Samuel U. King, Windsor, Vt.

109,913.—WRENCH.—Christian Knisely, Chicago, Ill.

109,914.—REVOLVING FIRE-ARM.—Charles J. Linberg and William J. Phillips, St, Louis, Mo.

109,915.—MITER-BOX.—Charles F. Linscott, Chicago, Ill.

109,916.—COMBINED HAND SEED-DRILL AND CULTIVATOR.—Samuel D. Lucas, Winterpock, Va.

109,917.—PUTTING UP POMATUM.—Elard Luddle, New York, N. Y.

109,918.—IRONING-TABLE.—James H. Mallory, La Porte, Ind.

109,919.—CHURN.—Chelton Matheny, Greensburg, Ind.

109,920.—FLOCK-MACHINE.—William McAllister, Lawrence, Mass.

109,921.—PIANO ACTION.—Frazee P. McGregor, Pontiac, Mich.

109,922.—PADLOCK.—William McIntyire, New York, N. Y.

109,923.—CORN-PLANTER.—Noah Mendenhall, Greensburg, Ind.
109,924.—WASHING-MACHINE.—Samuel S. Middlekauff, Hagerstown, Md.
109,925, antedated November 26, 1870.—WATER-WHEEL.—Mordecai Millard, Franklin, Ohio.
109,926.—TURBINE WATER-WHEEL.—Ransom Monroe, Hendricks Creek, Pa.
109,927.—THILL-COUPLING.—Francis B. Morse, Plantsville, Conn., assignor to himself and H. D. Smith & Co., same place.
109,928.—APPARATUS FOR DRESSING AND FURROWING MILLSTONES.—James Lee Norton, London, England.
109,929.—CAST-IRON PLOW.—John K. Odell and Wm. S. Little, Deckertown, N. J., assignors to G. W. Coe, same place.
109,930.—COUPLING FOR EARTH-BORING AUGERS.—Thos. Orchard, Lincoln, Cal.
109,931, antedated November 26, 1870.—METALLIC CARTRIDGE.—William I. Page, East Boston, Mass.
109,932.—CAR-COUPLING.—Jay R. Palmer, Mariposa, Cal., assignor to himself and James H. Hatch.
109,933.—SHOE-LACING HOOK.—Alphonso Patten, Biddeford, Me., assignor to himself and Robert W. Rumery, same place.
109,934.—CORN-PLOW.—Elwood Phillips, Centreville, Ind.
109,935.—SKATE.—Alfred C. Platt, Sandusky, Ohio.
109,936.—CORN-PLANTER.—Henry G. Porter, Hopkinton, Iowa.
109,937.—HALTER.—Robert Porter, Ottumwa, Iowa.
109,938.—WASHING-MACHINE.—Samuel Post and Henry D. Martin Ypsilanti, Mich.
109,939.—LETTER-BOX.—Albert Potts, Philadelphia, Pa.
109,940.—COKE-FURNACE.—Thomas Price, Steubenville, assignor to himself and James Cruthers, West Newton, Ohio.
109,941.—BUCKLE.—Francis Puetz, Buffalo, N. Y.
109,942.—APPARATUS FOR COOLING SODA-WATER AND OTHER LIQUIDS.—Alvan Davis Puffer, Boston, Mass.
109,943.—WAGON-SEAT FASTENING.—John Calvin Rankin, Mount Vernon, N Y.
109,944.—MARINE ENGINE.—W. B. Reaney, Chester, Pa.
109,945.—CORN-SHELLER.—George W. Reisinger, Harrisburg, Pa., assignor to William A. Middleton and Eugene Snyder, same place.
109,946.—SCRUBBING-BRUSH.—Ralph Rockwell and Zora B. Custer, Petroleum Centre, Pa.
109,947.—SKIRT.—Hugo Schultz, Paris, France.
109,948.—APPARATUS FOR PITCHING AND COATING BARRELS, CASKS, &c.—Louis Schulze, Baltimore, Md.
109,949, antedated November 25, 1870.—WRENCH.—Eliphalet S. Scripture, Brooklyn, E. D., N. Y.
109,950.—ELEVATOR AND DISTRIBUTOR.—Thomas Shanks, Baltimore, Md.
109,951, antedated November 28, 1870.—DIRECT-ACTING ENGINE.—Sidney F. Shelbourne, New York, and Charles E. Emery, Brooklyn, N. Y.
109,952.—POCKET-ALARM.—Calvin W. Simonds, Boscawen, N. H.; assignor to Hollis Towne, same place.
109,953.—BEVELING THE EDGES OF CIRCULAR PLATES OF METAL.—William H. Singer, Pittsburg, Pa.
109,954.—ALARM-LOCK.—Thomas P. Sink, Fairton, N. J.
109,955.—PUMP.—John B. Sivertson, Chicago, Ill.
109,956.—WAGON FOR LOADING TIMBER.—Jacob Skeen, Mound City, Ill.
109,957.—SLEIGH-BRAKE.—Henry W. Smith, Rainsburg, P
109,958.—CORK-SCREW.—John A. Smith, Brooklyn, N. Y.
109,959.—COMBINED HIGH AND LOW-WATER INDICATOR.—Levi F. Smith, Philadelphia, Pa,
109,960.—SHIFTING SHOVEL-PLOW.—Adam Snyder, Packard, Ohio.
109,961.—BOX FOR PACKING BOTTLES.—Joseph Jones Solomon, Philadelphia, Pa.
109,962.—DOOR-SPRING.—William H. Stafford, New York, N. Y.
109,963.—DIRECT-ACTING ENGINE.—William J. Stevens, New York, N. Y.
109,964.—DRAWER-HANDLE.—Casper A. Stock, New York, N. Y.
109,965.—END-GATE FOR WAGONS.—Roderick F. Stocking and Calvin P. Greene, Lawn Ridge, Ill.
109,966.—END-GATE FOR WAGONS.—Roderick F. Stocking and Calvin P. Greene, Lawn Ridge, Ill.
109,967.—HORSE-POWER.—Lorenzo P. Teed, Mechanicsburg, Pa.
109,968.—STOVE-GRATE.—John Merritt Thatcher, Bergen, N. J.
109,969.—COAL-SCREEN.—Edward Thomas, Shickshinny, Pa.
109,970.—BURGLAR-ALARM.—James Harry Thorp, New York, N. Y.
109,971.—ALARM-ATTACHMENT.—James H. Thorp, New York, N. Y.
109,972.—WATER-WHEEL.—Josiah Turner and Stephen Woodward, Sunapee, N. H.
109,973.—CLEVIS FOR SLED.—John Van Antwerp, Cleveland, Minn.
109,974.—POTATO-DIGGER.—Nicholas Vandenburgh, Schuylerville, N. Y.
109,975.—FIRE-EXTINGUISHER.—William P. Van Deursen, Cincinnati, Ohio.
109,976.—FIRE-EXTINGUISHER.—Jacob B. Van Dyne, Covington, Ky.
109,977.—CARRIAGE-WHEEL LUBRICATOR.—Samuel S. Vollum and William H. Green, New York, N. Y.
109,978.—MACHINE FOR POLISHING COFFEE.—Charles C. Warren and James B. Baldy, Toledo, Ohio.
109,979.—TWINE-HOLDER.—Rodolphus L. Webb, New Britain, Conn.
109,980.—STEAM-PUMP.—George M. Weinman, Columbus, Ohio.
109,981.—LANDAULET CARRIAGE.—Edward Wells, New Haven, Conn.
109,982.—MODE OF SETTING TIRE ON WHEELS.—Aaron O. Wheeler, St. Augustine Depot, Ill.
109,983, antedated November 26, 1870.—FRUIT-BASKET.—Geo. H. White, Huntington, N. Y.
109,984.—CANAL WASTE-WAY AND SLUICE-GATE.—Andrew Jackson Whitney, Harrisburg, Pa.
109,985.—COMBINED GRAIN HARVESTER AND BINDER.—John H. Whitney, Rochester, Minn.
109,986.—BEE-HIVE.—Robert A. Williams, Colusa, Cal.
109,987.—MACHINE FOR POINTING NAILS.—Harry A. Wills, Vergennes, Vt., assignor to National Horse-Nail Company, same place.
109,988.—HOISTING-MACHINE.—Nicolaus Wonlarlarsky, St. Petersburg, Russia.
109,989.—WATCH-CASE.—Alfred A. Wood, Charlotte, Mich.
109,990.—COMPOUND FOR TREATING MALT LIQUORS.—Wm. Zinsser, New York, N. Y.
109,991.—MANUFACTURE OF SUGAR OR SYRUP FROM SWEET POTATOES.—Charles Delamarre, New Orleans, La., assignor to himself, John A. Thurber, and Robert E. Benson, same place.
109,992.—AQUATIC TOY.—Amos W. Hart, Washington, D. C., assignor to himself and Wm. M. Tileston, same place.

REISSUES.

4,192.—MANUFACTURE OF PLATED METAL BRACKET.—John Barclay, Bergen, N. J.—Patent No. 84,064, dated August 24, 1869.
4,193.—SLEEPING-COLLAR.—Levi Dederick, New York, N. Y.—Patent No. 103,026, dated May 17, 1870.
4,194.—HARVESTER-RAKE.—Hiram H. Scoville, Oakland, Cal., assignor of one-half interest to Joseph A. Scoville.—Patent No. 23,613, dated April 12, 1859.
4,195.—TREENAIL.—Nathaniel L. Tomlinson, Mystic Bridge, Conn.—Patent No. 78,554, dated June 2, 1868.

DESIGNS.

4,501.—LAMP-CHIMNEY CLEANER.—Emeline T. Annis, Mount Morris, N. Y.
4,502.—DRAWER-PULL.—Nelson Merriam, West Meriden, Conn.

TRADE MARKS.

83.—CHOPPING-AX.—Bœtticher, Kellogg & Co., Evansville, Ind.
84.—UMBRELLA AND PARASOL.—Dawes, Fiske & Fanning, New York, N Y.
85.—TOILET-SOAP.—Deniker & Mellville, New York, N. Y.
86.—BROOM.—Richard W. English, Buffalo, N. Y.
87.—XXX BROOM.—Richard W. English, Buffalo, N.Y.
88.—XX BROOM.—Richard W. English, Buffalo, N. Y.
89.—WHISKY.—Frieberg & Workum, Cincinnati, Ohio.
90.—WHISKY.—C. P. Moorman & Co., Louisville, Ky.
91.—CHEWING PLANTER.—Pope & Baldwin, Quincy, Ill.
92.—CIGAR.—Rawson & Philbrick, Key West, Fla.
93.—INSTRUMENT.—Ridenour, Coblentz & Co., Springfield, Ohio.
94.—UMBRELLA AND PARASOL.—Jas. T. Smith. New York, N. Y.
95.—BAKING-POWDER.—Thompson & Steele, Chicago, Ill.

EXTENSIONS.

GEORGE J. TODD, of Lynn, Mass.—Letters Patent No. 16,128, dated November 25, 1856.
JONATHAN P. GROSVENOR, of Lowell, Mass.—Letters Patent No. 16,144, dated December 2, 1856.

Bituminous Coal Trade on Lake Erie.

THE first time that bituminous coal appears as an article of commerce at the Lake ports, was in 1829, when the northern division of the Ohio Canal was open to the edge of the Ohio coal field, near Akron. From this date until about 1854, when the Cleveland and Pittsburg and Cleveland and Mahoning railways penetrated the same coal field, it was brought to Cleveland wholly by canal. Until the past year Cleveland has received and shipped all the coal mined in Ohio, destined for other Lake ports. Sandusky has now become a shipping port for coal, from mines in the south-eastern part of the State.

Bituminous coal from Western Pennsylvania in the Shenango valley, on the eastern line of Ohio, began to be received and shipped at Erie, Pennsylvania. Previous to 1869, the two ports of Erie and Cleveland transacted substantially all the coal business of Ohio and Pennsylvania, on the Lakes. Coal from Illinois, being the first field on the west of Ohio which is accessible to lake navigation, began to be received in 1854.

BITUMINOUS COAL RECEIVED FROM THE INTERIOR AT ERIE, CLEVELAND AND CHICAGO, PRIOR TO 1858, IN TONS OF 2,000 POUNDS.

Year.	Cleveland.	Erie.	Chicago.
1829	708	.....	.....
1830	178	.....	.....
1831	294	.....	.....
1832	431	.....	.....
1833	1,719	.....	.....
1834	3,347	.....	.....
1835	1,776	.....	.....
1836	2,944	.....	.....
1837	6,421	.....	.....
1838	2,496	.....	.....
[illegible]	4,901	.....	.....
1[illegible]	6,028	.....	.....
1841	16,744	.....	.....
1842	16,339	.....	.....
1843	13,574	.....	.....
1844	18,901	.....	.....
1845	31,136	15,000	.....
1846	28,133	27,590	.....
1847	44,401	51,000	.....
1848	66,351	70,000	.....
1849	66,801	79,613	.....
1850	88,850	57,541	.....
1851	107,135	72,943	.....
1852	137,926	76,650	3,310
1853	173,915	123,031	2,195
1854	170,975	95,611	4,627
1855	299,803	141,184	9,569
1856	246,995	112,011	9,299
1857	321,390	126,159	37,327

Since 1857, I have not the means of continuing the above table of receipts at lake ports, which now include Oswego, Erie, Buffalo, Cleveland, Sandusky, Detroit, Michigan City and Chicago. It was only in 1865 that the Board of Trade at Cleveland published its first statistical report. With a view to enable you to bring up hereafter a full account of the traffic in bituminous coal on the waters of the northern lakes, I have gone over the reports on that subject which I am able to consult, and give the result below :

BITUMINOUS COAL RECEIVED AND SHIPPED AT CLEVELAND SINCE 1857—IN TONS OF 2,000 POUNDS.

Date.	Received by Canal.	Received by Rail.	Total.	Shipped.	Consumed at Cleveland.
1858	78,392	143,875	222,267	129,048	93,219
1859 to 1861 wanting.	.....	.....	.....	.....	.....
1862	81,100	265,306	346,706	.....	.....
1863	137,000	318,445	455,445	.....	.....
1864 wanting.	.....	.....	.....	.....	.....
1865	153,112	307,438	460,550	214,837	245,713
1866	171,569	404,806	576,393	279,840	296,553
1867	85,102	449,914	632,016	334,027	297,989
1868	[illegible]	547,904	745,439	392,388	353,051
1869	[illegible]	685,621	910,621	396,067	524,555

The rebellion was a stimulus to the manufactures of Cleveland, which is now surpassed by the increased consumption of coal. In the trade returns of the city is included the receipts of anthracite, which are becoming important, but which I have omitted in the above tables. It amounts now to about 10,000 tons.

The consumption of "black coal" at the furnaces in the valleys of the Shenango and Mahoning rivers is estimated at 300,000 tons. This variety is being rapidly exhausted, and already brings an extra price. It is, notwithstanding, shipped largely to other ports on the lake. At present there are but two railways which may be properly called coal roads. The greatest distance from which coal is now brought is 140 miles, in the vicinity of Pittsburg. Within that distance there is not less than 800 square miles of workable seams, and over half that space three to five seams available for this market. W. C.

CLEVELAND, Nov. 30, 1870.

BUSINESS AND PERSONAL.

[*Short notices in this column fifty cents per line each insertion.*]

GLYNN'S ANTI-INCRUSTATOR FOR STEAM BOILERS.—THE only and reliable article for removing and preventing incrustation. No foaming, and does not attack metals of boiler. Liberal terms to agents. C. D. FREDRICKS, 587 Broadway, N. Y.
April 19 tf

IMPORTANT TO INVENTORS.

WESTERN AND CO.'S PATENT AGENCY.

CHARLES ROGERS, Solicitor and Manager.

In connection with the publication of the ENGINEERING and MINING JOURNAL and the MANUFACTURER AND BUILDER, we have frequently received applications from subscribers and patrons to act as their agents in transacting business with the United States Patent Office; and in view of the increasing number and urgency of such requests, we have resolved to add this department to our business. We have accordingly organized

A COMPLETE PATENT AGENCY,

and now offer our services in procuring patents in this and foreign countries, and transacting all business relating to the obtaining of patents.

Being possessed of superior facilities, in connection with our associate attorneys in Washington and foreign countries, for the successful prosecution of this business, we do not hesitate to guarantee satisfaction to all who may entrust their business to our care.

We have engaged as solicitor and manager Mr. CHARLES ROGERS, a well-known expert in this department. Being a practical mechanic, and having been an examiner in the Patent Office at Washington for a number of years, besides enjoying an experience of more than twenty years as a solicitor of patents, Mr. ROGERS is intimately acquainted with all the details of the business, both in and out of the office.

The specifications, drawings, etc., prepared in our office, will be found to compare favorably with those prepared by any other establishment, while the intimate acquaintance of our manager with the routine of business in the Patent Office, gives us a decided advantage in managing difficult cases.

We are fully prepared to prosecute Rejected Cases and Cases in Interference and Infringements, and also to procure Reissues and Extensions of Patents.

We can also furnish Models for use in the Patent Office, to parties who may desire it, as we have made arrangements for this purpose with one of the most skilful machinists in this country, who possesses every facility for getting up models in the most perfect manner, at short notice, and on reasonable terms.

We shall give special attention to the prosecution of Rejected Applications, which have been improperly prepared by the inventor or incompetent attorneys.

We shall be ready at all times to furnish all necessary information and advice to intending applicants, and give our opinion as to the patentability of their inventions, free of charge; and we make it a rule never to take charge of a case unless we see a reasonable probability of obtaining a patent without first giving the inventor our candid opinion as to the probable result of the application.

OUR CHARGES.

Our charges are as moderate as those of any other responsible patent attorneys, as will be seen from the following figures: For preparing a case (whether simple or complicated) and attending to its passage through the Patent Office, our fee is from $30 to $40, which includes all the necessary papers and drawings. If the application is rejected we make no further charge, but prepare all necessary amendments, and, if requisite, appeal to the Board of Examiners-in-Chief. Most Patent Attorneys make an additional charge on each adverse action of the Patent Office, but we have found it more satisfactory to all parties interested to make our full charge at first; and as we expect no contingent fees, it is to our interest to prepare our cases properly at the commencement, thus avoiding annoyance to ourselves and delay in getting out the patent.

The cost of getting out a patent through our agency is—

For first Government fee, stamp, etc	$16
" our fee	$30 to 40
" final Government fee	20
Total	$66 to $76

If the case has to be appealed, the applicant pays the Government fee on appeal, $10; but we shall ordinarily make no additional charge for our services. The first two items are payable when the application is sent in, and the second Government fee when a patent has been allowed. Before an appeal is taken, in any case, the applicant will be fully advised of all facts and charges, and no proceedings had without his sanction; so that all inventors who employ our agency will know in advance what their applications and patents are to cost.

For Rejected Applications prepared by others, our charges vary somewhat according to the nature of the case, but are general ly as follows:

In advance, on receiving the case	$10
When the patent is allowed	$20 to 30
Total	$30 to $40

the applicant paying such Government fees as may be required.

For preparing and filling a Caveat,

Our fee is	$15
Government fee	10
Total	$25

For attending to the obtaining of Reissues, Extensions, etc. and preparing Assignments, our charges vary according to the labor involved.

We are possessed of all the facilities for the successful prosecution of applications for patents in Great Britain, France, Belgium, and other foreign countries, on favorable terms.

Inventors who reside out of New York, and wish to procure a patent, need not go to the expense of visiting this city or Washington, but may send us a model of their invention, or a sketch and brief description; this will enable us to decide as to its probable novelty and patentability, and we can proceed at once to prosecute the case. We shall, however, be glad at all times to see our friends from any section, and give them such information as we are possessed of relating to patents, free of charge. A Post-office order for $16, to pay the first Government fee and stamp duty, should be sent along with the model; our fee $30 to $40, being payable as soon as the application is ready to be sent to Washington.

Patents granted through this agency will be described and illustrated in the columns of the ENGINEERING AND MINING JOURNAL or the MANUFACTURER AND BUILDER, without further charge to the inventor than the cost of the necessary cuts.

All communications to be addressed to

WESTERN & COMPANY,
P. O. Box, 5969. 37 PARK ROW, NEW YORK.

Advertisements.

The special advantages of the ENGINEERING AND MINING JOURNAL, *as a medium for advertisers, are so great and so widely known that it may seem almost needless to call attention to them. It is extensively circulated among the engineers of the country and takes a position in this respect before any other publication of the kind. It has a large and constantly increasing circulation among miners and mine owners, and men connected with mining operations generally. As it is the only paper in the country that makes this subject a specialty it has this field entirely to itself and is the only direct and reliable means of reaching this class of persons. Being kept on file by almost every subscriber, it is dou'ly valuable as a permanent means of keeping an advertisement before the public. It is the recognized organ of the coal trade, and is taken extensively by the trade throughout the country and presents the very best means of reaching that very important class of men.*

Rates of Advertising.

The rate of advertising, compared with those of other weekly industrial publications, are very low, especially when the class of consumers among which its large circulation is almost entirely confined, is taken into consideration.

Back Page.....40 cents a line.
Inside Pages.....25 cents a line.

Engravings may head advertisements at the same rate per line, by measurement, as the letter-press.

MISCELLANEOUS.

TIN-LINED LEAD PIPE is lined with pure Block Tin—a m tal closely resembling silver, both in color and purity. No water, however pure, acts on it. Chemists distil water in tin retorts to secure a pure article. Dentists use it for filling teeth. All our cooking utensils are coated with it. Fruits and vegetables are preserved in tin cans. Lead is never used for such purposes, owing to its poisonous quality. Why, then, use it for water pipes, when a strong, safe, economical substitute is presented? Circulars and sample of pipe sent by mail free. Address

THE COLWELLS, SHAW & WILLARD MF'G CO.
213 Centre St., (bet. Canal and Grand Sts.) New York.
dec13-1t.

A NEW WORK, JUST PUBLISHED, ON SOLUBLE OR WATER GLASS—(Silicates of Soda and Potash, Liquid Quartz and Silex); (the only book printed on this subject in the English language), containing 350 pages, with several wood-cuts, by Dr. L. FEUCHTWANGER, New York.

Containing several hundred useful receipts to silicify Stone, Bricks and all Compositions of Minerals; to render R. R. Sleepers, Shingles, Wooden Pavements and Houses fire, water and dry rot proof; for making every species of Cements, Whitewashes, Paints and other Artificial Compositions; also, a guide for Soap and Glass Makers, concluded by Essays relating to the subject, such as Carbonic Acid, Limestones, Alkalies and Silica. Complete: price $3 12, mailed free by WESTERN & CO.
37 Park Row, New York. oct25:tf

WENTWORTH'S AMERICAN HARDWARE AND METAL TRADERS' DIRECTORY. Embracing a complete list of the

Manufacturers and Dealers in Iron, Steel, Hardware, Agricultural Implements, Machinery, Stoves, &c.,

in the United States, and all goods manufactured wholly or in part from the Baser Metals. Arranged alphabetically by States. A work of nearly 500 pages printed on tinted paper, and handsomely bound in green and gilt. Just published. A few copies for sale. Sent to any address, charges paid, on receipt of price, $6; extra binding, $8. Every manufacturer and dealer in the iron, steel and hardware interest, and every iron-founder and machinist in the United States should have this valuable work. Address WENTWORTH & CO., Publishers,
P. O. Box, 4278. 19 Central street, Boston, Mass.
dec13-1t.

AVELING & PORTER'S

PATENT ROAD LOCOMOTIVE,

OF WHICH THERE ARE AT THIS TIME UPWARDS OF

500 IN REGULAR USE IN EUROPE.

Has been awarded the First Prize Gold Medals at all the International Exhibitions of Europe, including London, 1862, Paris, 1867 and Brussels, 1868.

They are made from 4 to 20 horse-power; will haul from 10 to 60 tons along ordinary roads, and travel up inclines of 1 in 10. They are much simpler and more powerful; they are more durable and cost less, and are applicable to a greater variety of uses than any other Traction Engine made.

They are suitable for
STEAM PLOUGHING, DRIVING PUMPS, SAWS AND OTHER MACHINERY,
LIFTING AND LOWERING HEAVY WEIGHTS, STUMP PULLING, &c., &c.
AVELING & PORTER, Manufacturers, Rochester, Eng.
Agent for the United States: **W. Churchill Gastler,** 43 Exchange Place, New York.
TRAMWAY ENGINES FOR MINES, &c., STEAM PLOUGHS, STEAM ROAD ROLLERS, AGRICULTURAL LOCOMOTIVES.
Circulars on application. o11:6m

WOOD ENGRAVING

EXECUTED AT THE OFFICE OF

The Engineering and Mining Journal,

No. 37 PARK ROW, NEW YORK CITY.

STEAM PUMPS.

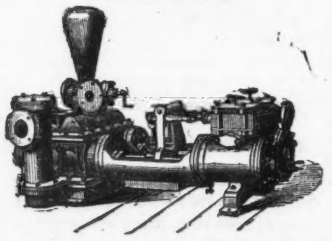
HYDRAULIC WORKS.

MANUFACTORY,

BROOKLYN, N. Y.

Steam Pumping Engines, Single and Duplex, Worthington's Patent, for all purposes, such as Water Works Engines, Condensing or Non-condensing; Air and Circulating Pumps, for Marine Engines; Blowing Engines; Vacuum Pumps, Stationary and Portable Steam Fire Engines; Boiler Feed Pumps, Wrecking Pumps,

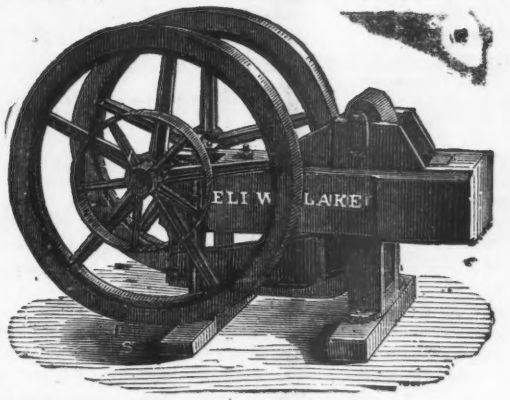
MINING PUMPS,



Water Meters, Oil Meters; Water Pressure Engines; Stamp Mills for Gold, Silver and Copper Ore; Eaton's Gatent Amalgamators for Gold and Silver; Steam and Gas Pipe, Valves, Fittings, etc. Iron and Brass Castings.
Send for Circular.
H. R. WORTHINGTON,
feb1-1y 61 Beekman Street, New York.

MISCELLANEOUS.

BLAKE'S STONE BREAKER.



The office of this Machine is to break Ores and Minerals of every kind into small fragments, preparatory to their further comminution by other machinery.

This machine has now been in use, enduring the severest tests, for the last ten years, during which time it has been introduced into almost every country on the globe, and is everywhere received with great and increasing favor as a labor-saving machine of the first order.

Illustrated circulars, fully describing the machine, with ample testimonials to its efficiency and utility, will be furnished on application, by letter to the undersigned.

☞ The Patents obtained for this machine in the United States and in England having been fully sustained by the courts, after well contested suits in both countries, all persons are hereby cautioned not to violate them; and they are informed that every machine now in use or offered for sale, not made by us, in which the ores are crushed between upright convergent faces or jaws actuated by a revolving shaft and fly-wheel, are made and used in violation of our patent.

Mch. 14-1y. **BLAKE BROTHERS, New Haven, Conn.**

JOHN A. GRISWOLD, ERASTUS CORNING. ERASTUS CORNING, JR., CHESTER GRISWOLD.

JOHN A. GRISWOLD & CO.,

PROPRIETORS OF THE

RENSSELAER IRON WORKS,

TROY, N. Y.

Bessemer Steel Works, Fort Edward Blast Furnace and Columbia Blast Furnace

MANUFACTURERS of PIG IRON, RAILROAD, MERCHANT AND SHIP IRON,

Bessemer Steel Rails, Axles, Tyres, Shafting Plates and Steel Forgings,

OF ALL DESCRIPTIONS.

Office in New York, No. 56 Broadway.

May 17:1y

NEW JERSEY ZINC COMPANY.

B. S. GIBLIN, Treasurer. GEORGE A. BELL, President

WORKS NEWARK, N. J., OFFICE No. 61 MAIDEN LANE NEW YORK.

Franklinite Pig Iron (Spiegeleisen), Spelter, Oxide of Zinc, Spiegeleisen Cinder for Blast Furnaces.

May 24:1y

LEHIGH ZINC COMPANY.

GORDON MONGES, Treasurer. B. C. WEBSTER, President.

WORKS, BETHLEHEM, PA. OFFICE, 333 Walnut Street, Philadelphia.

JOHN JEWETT & SONS, AGENTS, 182 FRONT STREET, NEW YORK.

OXIDE OF ZINC, SPELTER, SHEET ZINC.

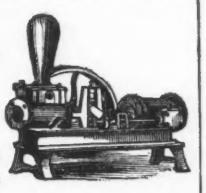
Jun28:1y

J. CLAYTON'S

Patent Fly Wheel and Direct Action

STEAM PUMPS,

HAND PUMP AND STEAM ENGINE COMBINED.



These pumps are the cheapest first-class pumps in the market.

All sizes made to order at short notice.

JAMES CLAYTON, 24 & 26 Water st.,

Office: 50 & 52 John street, New York.,
Nov18-tf Brooklyn, N. Y.

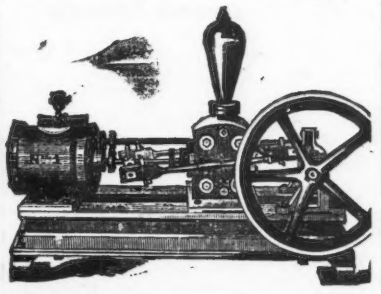
THE WOODWARD

Steam Pump Manufacturing Company.

MANUFACTURERS OF THE

WOODWARD PATENT IMPROVED SAFETY

Steam Pump and Fire Engine.



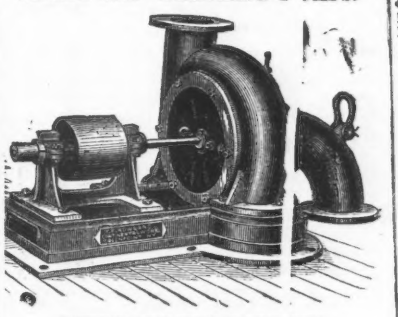
STEAM, WATER, AND GAS FITTINGS OF ALL KINDS.

Also dealers in WROUGHT IRON PIPE, BOILER TUBES, etc. Hotels, Churches, Factories, and Public Buildings, heated by Steam, Low Pressure.

Woodward Building, 76 and 78 Centre street, corner Worth street, New York. Formerly 77 Beekman street
mar 14-1y GEORGE M. WOODWARD, Pres't

IMPROVED

MINING AND WRECKING PUMPS.



LEBBY AND DUC PATENTS.

MANUFACTURED SOLELY BY

T. F. ROWLAND, CONTINENTAL WORKS,

Greenpoint, Brooklyn, N. Y.

New York Office, No. 64 Broadway, Room 33.

Send for Illustrated Circular. july16-1y

COAL SHIPPERS.

RANDOLPH BROTHERS, Sole Agents of the original

Spring Mountain Lehigh Coal.

Extensively used for Smelting Iron.

Rooms, 28 and 30 Trinity Building,
pr6tf NEW YORK.

WILKESBARRE COAL, DELIVERED DIRECT from the Mines of

The Wilkesbarre Coal and Iron Co.,

or for re-shipment at

HOBOKEN AND JERSEY CITY.

OFFICE:

ap1-1y 80 Broadway, New York.

POWELTON COAL AND IRON COMPANY Sole Shippers of the Celebrated

Powelton Semi-Bituminous Gas AND ANTHRACITE COALS.

104 Walnut street, Philadelphia.

BRANCH OFFICES:

New York, Trinity Building; 17 Doane street, Boston
Cleveland, O.; Pittsburgh, Pa. jan.30-1y

COAL SHIPPERS.

THE DESPARD COAL COMPANY OFFER their Superior DESPARD COAL to Gas Light Companies throughout the country.

MINES IN HARRISON COUNTY, West Virginia.

Wharves, Locust Point, Company's Office, No. 29 South st. } Baltimore.

AGENTS:

PARMELE BROTHERS, No. 32 Pine street, New York.
BANGS & HORTON, No. 31 Doane street, Boston.

Among the consumers of Despard Coal we name Manhattan Gas Light Co., New York; Metropolitan Gas Light Co., New York; Jersey City Gas Light Co., Jersey City N. J.; Washington Gas Light Co., Washington, D. C. Portland Gas Light Co., Portland, Maine.

☞ Reference to them is requested. may30-1y

LEWIS AUDENRIED & CO., MINERS AND Shippers of the following celebrated

ANTHRACITE COALS.

From Philadelphia and the Mines,

DIAMOND, Red Ash; SPOHN, Red Ash; ORCHARD, Pink Ash; BROAD MOUNTAIN, White Ash; LOCUST MOUNTAIN, White Ash; BLACK HEATH, White Ash; Old Company's Lehigh; Wilkesbarre.

From Port Johnston and Jersey City,

Old Co.'s Lehigh, Hazleton, Wilkesbarre, and Shenandoah Coals.

Also the superior CUMBERLAND COALS.

BROAD TOP, SEMI-BITUMINOUS, at Philadelphia. BARTON, GEORGES CREEK, at Baltimore. BARTON, GEORGES CREEK, at Alexrndria.

205 Walnut street, Philadelphia; 14 Kilby street, Boston
34 Westminster st., Providence; 24 Second st., Baltimore
110 BROADWAY, NEW YORK. Jan13.y

G. B. LINDERMAN & CO.,

MINERS,

Sugar Loaf, Lehigh Coal.

OFFICE, 50 TRINITY BUILDING, 111 BROADWAY
may23-1y NEW YORK.

COXE BRO.'S & CO., CROSS CREEK COLLIERY Miners and Shippers of the Celebrated

Cross Creek Free Burning Lehigh Red Ash COAL.

FROM THE BUCK MOUNTAIN VEIN.

OFFICES:

Philadelphia, No. 341 Walnut street.
Drifton, Jeddo P. O., Luzerne Co., Pa.
Agent in New York, SAMUEL BONNELL, Jr.,
Room 43, Trinity Building,
feb-1y 111 Broadway.

HONEY BROOK COAL COMPANY, Exclusive Miners and Shippers of the Celebrated

Honey Brook Lehigh Coal,

No. 111 BROADWAY, NEW YORK.

JAMES H. LYLES, Agent.

Wharves, Port Johnson, N. J. Philadelphia office 209 Walnut street.
ap20-1y J. B. McCREARY, President.

WHITE, FOWLER & SNOW.

Wilkesbarre and Lehigh Coal,

FOR STEAM AND FAMILY USE.

OFFICE

Room No. 75, 111 BROADWAY, (Trinity Building).
jan1-1y JNO. WHITE, LINDLEY H. FOWLER, LOUIS T. SNOW.

THE NEWBURGH ORREL COAL COMPANY.

Mines at Newburgh, Preston Co., W. Va.
Company's Office, No. 52 S. Gay St. Baltimore, Md.
C. OLIVER O'DONNELL.....President.
CHAS. MACKALL.....Secretary

This Company offer their very superior Gas Coal at lowest market prices.

It yields 10,996 cubic feet of gas to the ton of 2,240 lbs. of good illuminating power, and of remarkable purity; one bushel of lime purifying 6,792 cubic feet, with a large amount of coke of good quality.

It has been for many years very extensively used by various Gas Companies in the United States, and we beg to refer to the Manhattan, Metropolitan, and New York Gas Light Companies of New York, the Brooklyn and Citizens' Gas Light Companies of Brooklyn, N. Y., the Baltimore Gas Light Company of Baltimore, Md., and Providence Gas Light Company, Providence, R. I.

The best dry coals shipped, and the promptest attention given to orders. sep21-1y

SAMUEL BONNELL, JR., OFFERS FOR SALE his SUGAR CREEK and HONEY BROOK

LEHIGH COALS,

OFFICE:

43 and 45 TRINITY BUILDING, 111 BROADWAY,
New York. Jan:1y

WILLIAM R. TAYLOR,

Kings County Steam Boiler-Works,

MANUFACTURER OF

High and Low-Pressure Steam Boilers.

ALSO,

TAYLOR'S PATENT UPRIGHT RETURN TUBULAR BOILERS,

TANKS, GASOMETERS, SUGAR PANS, COOLERS,

OIL-STILLS AND OIL-TANKS.

ALSO,

ANDERSON'S Improved Machine for

GRINDING SEATS OF VALVES.

Nos. 345 and 347 First Street,

(Old Nos. 277 and 279,)
Near North-Fourth, (P. O. BOX 213.) Brooklyn, E. D.
J. M. RING, Sole Agent. 265 Broadway, New York.
Special attention given to repairs. dec6-6m

FACTS FOR THE LADIES.—I have used my WHEELER & WILSON Sewing Machine over ten years without repairs, and without breaking a needle, although I commenced the use of it without any instruction. Have used it constantly for family sewing: have quilted ten whole quilts of the largest size, and it is still in complete order, runs like a top, and bids fair to be willed to those who come after me, with better power of production than an unbroken prairie farm.
WHITEWATER, WIS. MRS. H. E. G. AREY.

E. F. DUNNE,

Attorney and Counsellor at Law,

1301 F STREET, WASHINGTON, D. C.,

PACIFIC COAST.—Will practice in all the Federal Courts. Specialty in Patents for Lands, Mines, and Town-Sites. mar15-1y

MAGIC LANTERNS FOR SUNDAY Schools, Academies, Public Exhibitions, and Parlor Entertainments. Illustrated priced catalogues sent free. T. H. McALLISTER, Optician,
Dec 21-6m 49 Nassau street, N. Y.

PUBLICATIONS.

NOW READY.

Third Edition, Seventh Thousand, Revised, Enlarged, and Improved,

HOPTON'S CONVERSATIONS on MINES,

BETWEEN

FATHER AND SON,

ENLARGED FROM 112 TO 192 PAGES.

The Following are the Contents:

Air, why it is propelled down, into and around the workings
" Quantity of, produced by the furnace.
" Friction of
" The great friction of produced by one mode of ventilation, and how reduced by another
" Pure added to impure (plans.
" Splitting of (plans)
" One current of (plans)
" One current of, and how to adopt separate currents (plan)
" Dividing of, but not into "separate and and distinct" current (plans)
" Crossings (see H on plans)
" Weight of in shafts
" How to find the weight of
" Table of pressure in shafts
Expansion of
...ve ...ity and force
" Rush ... into each division
" Quantity produced by natura ventilation
Splitting, why it should be adopted
Splitting, why the workmen object to Mr. Hopton adopting the mode
Anemometer, measurement of air by, engraving of
Area of a pit, how to find
Barometers, Showing the time of an outlet of gas in mines (engraving)
Bricks, how to find the number in the walling of a shaft.
Buddle's plan
Circumference of a pit, how to find
Coal, several ways of working it out, and why man methods of working it out are adopted
" Working out in banks (plans)
" Working it out in following up banks (plan)
" Working out in pillars (plans)
Working out in long wall (plans)
Working out in drifts (plans)
" Working out with no regularity (plan)
" Working out by the "end way" or in endings (plan)
Cubical Contents of a pit, how to find
Dialing, the mode f
Dials, several engravings
" How constructed
" How fixed in mine surveying
" Needle, its variations
Diameter of shaft
Dip of mine, how to find and lay on (plan)
Explosion, the power of an
" At Lund-hill, in what part of the mine it was supposed to take place (plan)
" How the power may be diminished
urnace, how to find the horse-power of
" The place of fixing, to produce the largest ventilating current
" Engravings of ground floor, front and back view
" Remarks upon
ses, (carbonic acid) composition of
Do. properties of
(After, or choke damp) composition of
(Carburetted hydrogen) do.
Choke damp and carbonic acid, not one and the same in quality
The effect produced on people by inhaling such
The quantity required for an explosive mixture
The elasticity of
The weight of
The nature and quality of
Why some mines generate and produce more than others
Why some mines generate a mixture of
...ode, or gob, how tramrods are made through (plan
...und-hill (plan)
Managers, who are best competent to manage mines
Miscellaneous questions
Natural ventilation
Planning, how workings are laid on the plan
Regulations (see R on plans)
Safety Lamps, why flame will not penetrate through, engraving of
Sections on mechanical ventilation
Summary of accidents
Surveying, how mines are with the dial
Surveying, how mines are with the theodolite
Tables of weights and measures
Temperature on surface
Temperature in mines
Temperature, difference of between down and up-cast
Theodolites for mine surveying
Theodolites, how constructed
Theodolites, the magnetic needle dispensed with, and how workings are laid on plan, with Theodolite surveying
Theodolites, how mines are surveyed with them
Up-cast larger than down-cast (plan)
Ventilating mines by mechanical power
Ventilation, several ways of
Weather, how a change of affects the workings
Workmen, capabilities of

Testimonials, Reviews, etc.

"Such a work, well understood by miners, would do more to prevent colliery accidents than an army of inspectors."—*Colliery Guardian.*

"The book cannot fail to be well received by all connected with collieries."—*Mining Journal.*

"Its contents are really valuable to the miners of this country."—*Miner's Conference.*

"I have works priced at £4 that do not contain the same information."—W. W. KENRICK, Colliery Viewer.

"The work is replete on the subject of underground management."—M. BARNES, Colliery Proprietor.

"I have had twenty years' management. It is the best work I ever read, and deserves to be circulated in very colliery district."—JOSEPH EAMES.

WESTERN & CO.,
Sole Agents for the United States.

For sale at the office of the ENGINEERING AND MINING JOURNAL, 37 Park Row, New York, and through any Bookseller. Price $1.

PUBLICATIONS.

PUBLICATIONS OF THE

AMERICAN INSTITUTE OF ARCHITECTS.

WESTERN & COMPANY

Having made arrangements with the Committee on Library and Publications of the above Association, are prepared to furnish the publications of the Institute to the trade and the public.

The Publications consist of the Proceedings of the Annual Conventions of the Institute, and Papers read before the Chapters of that body, as well as Papers contributed by Members of the Institute and published by its Committee on Library and Publications.

They are elegantly printed Pamphlets of large quarto size, with two columns to a page.

The Pamphlets thus far issued comprise the publications for two years past, and cover transactions of three years.

LIST OF PUBLICATIONS TO DATE.

I.

PROCEEDINGS OF THE ANNUAL CONVENTION OF THE

American Institute of Architects

Held in New York, October 22d and 23d, 1867.

Comprising, Minutes of the Convention, The Annual Address by Richard Upjohn, President; Reports of the Trustees and Standing Committees, and the Closing Address.

32 Pages, Quarto.....Price, 30 cents.

II.

FIRE-PROOF FLOORS

FOR

Banks, Insurance Companies, Office Buildings, and Dwellings.

Tables Shewing the Distances from Centres at which Rolled Iron Beams should be Placed, and the Weight of Metal per superficial foot of the Floor,

BY R. G. HATFIELD, F. A. I. A.

8 Pages, Quarto.....Price, 30 cents.

III.

Proceedings

OF THE

SECOND ANNUAL CONVENTION

Held in New York, December 8, 1868.

Comprising the Minutes of the Convention, The President's Address by Richard Upjohn, Esq., and the Reports of Trustees and Standing Committees.

16 Pages, Quarto.....Price 40 cents.

IV.

REMARKS

ON

FIRE-PROOF CONSTRUCTION;

A Paper read before the New York Chapter of the American Institute of Architects, April 8, 1869.

BY P. B. WIGHT, F. A. I. A.

8 Pages, Quarto.....Price, 30 cents.

V.

THE

Architectural and Other Art Societies of Europe;

SOME ACCOUNT OF THEIR

ORIGIN, PROCESSES OF FORMATION, AND METHODS OF ADMINISTRATION,

With suggestions as to some of the conditions necessary for the maximum success of a National American Architectural-Art Society, with its local dependencies.

BY A. J. BLOOR,

FELLOW OF THE AMERICAN INSTITUTE OF ARCHITECTS

Read before the New York Chapter A. I. A., February 16, 1869.

62 Pages, Quarto..... Price, $1

VI.

PROCEEDINGS OF THE THIRD ANNUAL CONVENTION, held in New York, Nov. 16 and 17th, 1869.

Comprising the Annual Address by Richard Upjohn, President; the Reports of Trustees, Standing Committees and Chapters; papers read by Adolph Chess, R. G. Hatfield, and Richard Upjohn; Debates on matters of Professional interest, and the closing address of Professional Guilds, by E. L. Godkin. 69 pages quarto. Price $1.

The above Pamphlets may be had singly, and will be sent by mail to any address on receipt of the price.

THE TRANSACTIONS BOUND.

The Publications of the Institute may also be had bound in cloth, making a handsome quarto volume of 196 pages, comprising the Transactions of the Institute for three years, ending November 16, 1869, the time of holding the Annual Convention for 1869. Price, $4.

WESTERN & COMPANY will also publish the papers to be read at the meetings of Chapters of the Institute, during the coming year in the ENGINEERING AND MINING JOURNAL, and abstracts in the MANUFACTURER AND BUILDER, which will be duly announced. Address,

WESTERN & COMPANY,
No. 37 PARK ROW, NEW YORK.

PUBLICATIONS.

BE IT KNOWN,

THAT THE PUBLISHERS OF THE

Manufacturer and Builder,

For the month of November, offer

Three Months' Subscription Free,

AS FOLLOWS:

Every new Subscriber to the Third Annual Volume, for 1871, whose subscription is received during the months of October and November, will be presented with the paper for October, November, and December, free of charge.

See the Advantages of this Offer.

Single Subscribers pay $1 50 per volume; but a **new** subscriber sent in during the months of October and November, for 1871, gets the paper **15** months, which is at the rate of only

$1 20 A Year, or 10 cents a Month!

Four Subscribers sent together pay $5 per volume; but four **new** subscribers sent in during the present and next month, for 1871, get the paper **15** months for the same price, which is at the rate of only

$1 A Year, or 8⅓ cents a Month for each.

Ten Subscribers, sent together, pay $12 per volume; but ten **new** subscribers sent in during October and November, for 1871, get the paper **15** months for the same price, which is at the rate of only

96 cts. a Year, or 8 cts. per Month for each.

Twenty subscribers, sent together, pay $20 per volume; but twenty **new** subscribers sent in *now* for 1871, get the paper **15** months for the same price, which is only

80 cts. a year, or 6⅔ cts. a month for each.

Every reasonable man who knows anything at all about the expense of getting up a magazine like the

Manufacturer and Builder,

will admit that this offer leaves *no margin of profit to the publishers.* But then that is their lookout.

They Want Everybody to see it, and Everybody to take it,

and if they think they can afford to

Give the Paper away,

So much the better for subscribers, *they* profit by it!

So much the better for the advertisers, *they* profit by it!

The aim of the publishers is to have

EVERYBODY SATISFIED.

Their profit for the present lies in this. So don't be afraid you will ruin us.

Send in your Names

By 5's,
10's,
20's,
50's,
100's,
1000's,

and we will shoulder the responsibility, and send the paper regularly. Address

WESTERN & CO.,
37 Park Row, New York.

ENGINEERS.

P. H. VAN DER WEYDE, M. D.,
(Late Professor of the N. Y. Medical College, of Mechanics, etc., at the Cooper Institute, and of Industrial Science at the Girard College, Philadelphia.)

Analytical & Consulting Chemist and Engineer.

RESIDENCE, 73 Seventh Street.
Office ENGINEERING AND MINING JOURNAL, 37 Park Row New York City. jan30tf

R. P. ROTHWELL,
MINING AND CIVIL ENGINEER AND METALLURGIST,

From the Imperial School of Mines, Paris, member of the Geological Society of France, etc,
OFFICE, WILKESBARRE, PA.

Having had a large practical experience in Europe and this country, is prepared to examine and report on all kinds of mineral property, superintend mines, and metallurgical works, assay ores, etc. 18-2-qp

EDWARD C. MILLER, ARCHITECT AND CIVIL ENGINEER, Nos. 4 and 6 Broad street, Rooms 17 and 17½.

Has been engaged for many years in preparing plans for Churches, Dwellings and other Buildings, and in superintending their erection, and has superintended a considerable portion of the various constructions in the Central Park of New York, and Prospect Park, Brooklyn, having, in the latter case, prepared the plans, specifications and estimates of all the Bridges, the Fountain Basin, and minor works of adornment, upon which these structures have, for the most part, been completed. Is now ready to furnish Designs, Working-Drawings and Specifications for any description of building, and to superintend the construction thereof. References: Jas. S. T. Stranahan, Esq.; Martin Kalbfleish, Esq.; Andrew H. Green, Esq.; Charles Hudson, Esq. mar 8

ADOLPH OTT,
CHEMICAL ENGINEER,

May be employed professionally as an expert on practical subjects, involving both Chemical and Mechanical knowledge. A specialist in various branches of Technology. Assays and Analyses of all kinds. Address, Editorial Rooms of the "Engineering and Mining Journal," 37 Park Row, New York City.
☞ Written communications preferred. nov28-tf

THEODORE ALLEN,
ENGINEER,
No. 45 William street, New York.

Designs and Specifications prepared for all kinds of Iron Ships and Steam Machinery. Construction and Repairs superintended. Experiments conducted. Advice given, etc. All kinds of Machinery furnished Manufacturers' prices. feb8-tf

JULIEN THOULET, GRADUATE OF THE University of Paris, Member of the Society of Engineers of France, employed for several years in Spain, Italy, and America, as Chemist and Mining Engineer, would accept an engagement in a mining or smelting establishment. The highest references furnished.
Address, by letter, No. 3 William street, New York. Feb. 15:tf

WILLIAM F. McNAMARA,
SOLICITOR OF PATENTS.
AND COUNSELLOR-AT-LAW.
No. 37 PARK ROW, NEW YORK, ROOM 22.
Advice in Patent Law given free. mar 8:tf

INSTRUCTION.

SCHOOL OF MINES, COLUMBIA COLLEGE.

FACULTY.—F. A. P. BARNARD, S.T.D., LL.D., PRESIDENT; T. EGLESTON, Jr., E. M., Mineralogy and Metallurgy; C. F. CHANDLER, Ph. D., Analytical and Applied Chemistry; JOHN TORREY, M.D., LL.D., Botany; C. A. JOY, PH. D., General Chemistry; W. G. PECK, LL.D., Mechanics; J. H. VAN AMRINGE, A.M., Mathematics; O. N. ROOD, A.M., Physics; J. S. NEWBERRY, M.D., LL.D., Geology and Paleontology. Regular courses for Mining Engineering; Metallurgy; Geology and Natural History; Analytical and Applied Chemistry. Special students received for any of the branches taught. Particular attention paid to Assaying. For further information and catalogues, apply to
DR. C. F. CHANDLER,
nov21-1y-is Dean of the Faculty.

THE BISHOP GUTTA-PERCHA WORKS,
422, 424 & 426 East 25th St.
Office at Factory, **NEW YORK.**
SAMUEL C. BISHOP, Proprietor,

The *only* manufacturer in the United States of every variety of goods, made from *Pure Gutta-Percha.*

SUBMARINE TELEGRAPH CABLES.

Submarine Wires, insulated for Mining and Blasting use.

Telegraph and Electric Wires for office and other uses, of all sizes; Cotton and Silk Covered Wires, of all sizes; Bishop's Compound Cordage for air lines and outside connections; Underground Wires, covered with Gutta-Percha and Lead protection; Underground Wires, with fibre and Bishop's Compounds.

Any kind required made to order.

In addition to Telegraph and Electric Goods, I make all kinds of Pure Gutta-Percha goods, such as Belting for use in Water; Sheet for Surgical use; Sheet for various Mechanical uses; Lining for Acid and Chemic a Baths; Bottles, Pitchers, and Funnels for Acids; Tiss Sheets for Caps and Hats; Soda and Beer Pipe; Boss for Flax Machinery, etc., etc.

N. B.—TILLOTSON & CO., 8 Dey street, New Yor and BLISS, TILLOTSON & CO., 247 South Water stree Chicago, are General Agents for the sale of any Telegrap and Electric Goods made by me, at Factory prices.

JOHN THORNLEY, 503 Chestnut street, Philadelphia, Pa., is Agent for the sale of any goods made by me at Factory prices.

☞ Orders also received at Factory for all kinds made.

Any goods of my manufacture, "excepting Telegraph and Electric Goods," are for sale in New York, by H. G. NORTON & CO., 26 Park Place; RUBBER CLOTHING CO., 347 Broadway; A. D. & C. A. HODGMAN, 201 Broadway, N. Y. sept13:4m

DUNCAN, SHERMAN & CO.,
BANKERS,
Corner of Pine and Nassau Streets, New York.

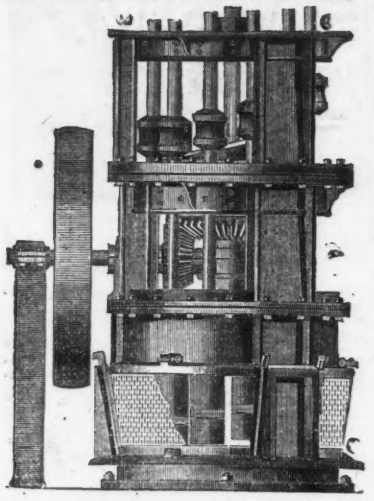
Issue Circular Notes and Letters of Credit for Travelers, available in all the Principal Cities in the World.

TRANSFERS OF MONEY TO EUROPE AND THE PACIFIC COAST BY TELEGRAPH.

☞ Interest allowed on Deposits. feb-1y

MINING MACHINERY. ETC.

MINING MACHINERY OF ALL KINDS.
MANUFACTURED BY MOREY & SPERRY.



HOWLAND PATENT ROTARY BATTERY

of 12 stamps. It requires no frame to put it up. Guaranteed to crush 2½ to 3 tons per day to the stamp. The best Battery ever used for amalgamating gold, or crushing silver ores, dry or wet. Can be put up on a mine in running order for one-half the price of the straight battery, and in three days after its arrival at the mine. 12-stamp battery, 20,000 pounds, with frame complete, price $3,000; 6-stamp battery, 8,000 pounds, price $1,300. Every mill run at shop before shipping.

CALIFORNIA STAMP MILLS,

All the various styles of Pans, Amalgamators, Separators, Settlers, Concentrators, Dry or Wet, for working Gold, Silver or Copper Ores, the same as built in California and at lower prices. SHOES AND DIES made of the best white iron. Send sizes and we will make patterns and forward Shoes and Dies at low prices. Engines, Boilers and fixtures, and other Machinery made to order. Also, Howland's Patent Rotary Valve Double or Single Engines.

Irons for the best California 10-stamp mill, straight battery, complete, $1,600. Irons for low mortar, old style mill, much less.

☞ Send for a Circular.

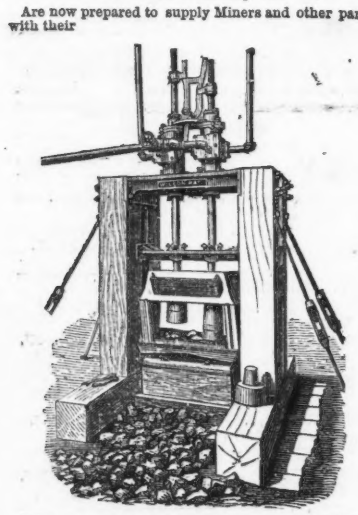
Address
MOREY & SPERRY,
Jan 10:y 95 Liberty Street New-York.

THE WILSON PATENT

Steam Stamp-Mill Company,

OF PHILADELPHIA, PA.

Are now prepared to supply Miners and other parties with their



New Steam Stamp-Mills

AT THE SHORTEST NOTICE.

These Mills have now been in operation for upwards of a year, and have proved to be the most durable and efficient, as well as the lightest for transportation, of any mills now used. The valve gear is of the simplest and most durable construction, readily adjustable by movable cams on the piston rods or stamp stems, thereby giving the operator absolute control of the length and velocity of motion and force of the blow. These Mills are adapted for both dry and wet crushing, and for the hardest rock or softest cement. These Mills are every way equivalent to a Twenty Stamp Mill. For further particulars call on or address

THE WILSON PATENT STEAM STAMP-MILL COMPANY,
Aug31-1y 326 Walnut street, Philadelphia.

KROM'S DRY ORE CONCENTRATOR.

Concentration by means of Air

has long been attempted, but hitherto without satisfactory results. **S. R. Krom** has invented and patented machines which concentrate the various ores more perfectly than can be done by any other means.

The *MECHANICAL COMBINATIONS* are extremely simple, the machines therefore correspondingly durable. A continuous self-delivery of ore on one side and tailings on the other is effected, hence very little attention is required except keeping the hopper supplied with ore The power of one man is sufficient to operate a mach in that will concentrate one ton per hour.

PARTIES INTERESTED IN MINING are invited to call at No. 210 Eldridge Street, New York, where they may see a machine in operation, and have samples of their own ores crushed and concentrated.

Illustrated Circulars may be had on application to
STEPHEN R. EROM,
sa10,1y-ls No. 210 Eldridge Street, N. Y.

ENGINES, IRON WORK, ETC.

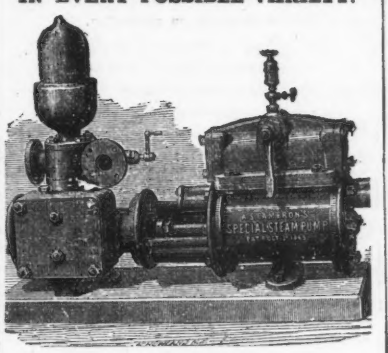
RICHARD DUDGEON,

No. 24 Columbia st.,
NEW YORK,
Maker and Patentee of
Hydraulic Jacks
AND
Punches,
Roller Tube Expanders, and Direct Acting
Steam Hammers.
Communications by letter will receive prompt attention.

JACKS for pressing on CARWHEELS or CRANK PINS made to order. May22:1y

---

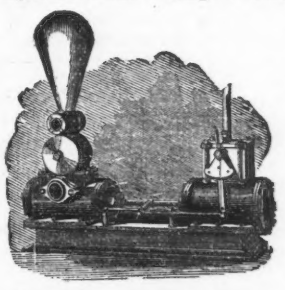
PUMPS
IN EVERY POSSIBLE VARIETY.



A. S. CAMERON & CO.,
FOOT 23d STREET, E. R.,
oct18:1y NEW YORK.

Niagara Steam Pump Works.

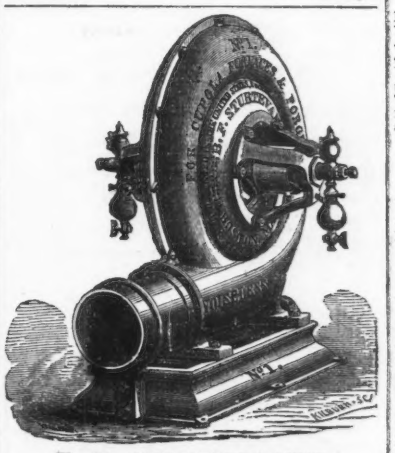
FIRST PREMIUM



AMERICAN INSTITUTE, 1867.

CHARLES B. HARDICK,
9 ADAMS STREET, BROOKLYN, N. Y.
Sole Manufacturer of
HARDICK'S PATENT DOUBLE-ACTING
Steam Pump and Fire Engine.
Patented in England, Belgium and France. Send for circular. feb-13-1y

---

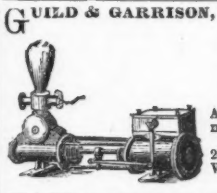


B. F. STURTEVANT'S
PATENT IMPROVED
PRESSURE BLOWER,
FOR CUPOLA FURNACES AND FORGES.

Also manufacturer of the Sturtevant Patent Improved Fan Blower and Exhaust Fan. Send for illustrated catalogue.

B. F. STURTEVANT, 72 Sudbury street, Boston, Mass.

GUILD & GARRISON, MANUFACTURERS OF



Steam Pumps,
Vacuum Pumps,
Steam Engines,
Vacuum Pans,
And all the various connections. For sale at the STEAM PUMP WORKS,
26, 28 and 30 First street,
Williamsburgh, N. Y.
sep14-6m

AGENTS AND CANVASSERS WANTED

IN EVERY CITY AND TOWN IN THE UNITED STATES,
FOR THE
Engineering and Mining Journal.
Liberal inducements. Specimens sent free. Address
WESTERN & COMPANY,
37 Park Row, New York.

MACHINISTS' SUPPLIES.

THE ALLEN ENGINE WORKS,
Fourth Av. and 130th and 131st Streets,
New York City.
MANUFACTURERS OF
THE ALLEN ENGINE
Porter's Governor, The Allen Boiler,
AND
Standard Straight-Edge Surface-Plates and Angle-Plates.

These Works are readily reached by the Harlem boats from Peck Slip, by the Second and Third Avenue railroads, and by the Harlem cars from 26th street.
☞ Send for Illustrated Pamphlet. dec5-1y

IRON FRAME GANG MILLS—Will cut more and better lumber than any in use. Require no millwright work to set them up. Manufactured by
dec13 SNYDER BROTHERS, Williamsport, Penn.

TO GOLD AND SILVER COMPANIES.—A SMELTER who has worked at the reduction of Leaf and Copper ores containing Gold and Silver, with extraction of Silver by Zinc, wants an engagement. Address M., Box 3201, N. Y. P. O. dec13:3w

---

No. 2 of "Studier i Grufbrytnings—vetenskap," containing "UEBER GESTEINSBOHRMASCHINEN" by F. M. STAPFF. Quarto, with 11 lithographic tables. Price $6.00. For sale by
Nov. 15:7t WESTERN & CO.

Substantial Success Based on Merit!

THE
IRON WORLD AND MANUFACTURER
IS PUBLISHED WEEKLY AT
Pittsburgh, Pa.,
AND IS THE LEADING—IF NOT THE ONLY—REPRESENTATIVE JOURNAL OF THE METAL TRADES PUBLISHED IN THE UNITED STATES.

Located in the very centre of the metal interests of the United States, with offices and correspondents at the leading cities of the East, West and South, we do not err in claiming that it is the REPRESENTATIVE JOURNAL of the Metal Manufacturers, Workers and Dealers, of this country.

THE IRON WORLD AND MANUFACTURER has a large and extended circulation throughout the United States, and is taken by Iron and Steel Manufacturers, Machinists, Founders, Hardware Dealers and Tinners, Gunsmiths, Plumbers, Cutlery Manufacturers, File Manufacturers, Saw Manufacturers, Boiler Manufacturers, and by

Leading Railway Officials.

It advocates protection to American Manufactures! Its markets are full and reliable. Able correspondents travelling in the West and South. Manufacturing items are a leading feature. Its manufacturing items are copied by the Press throughout the country.

Only $4 per annum!

If you are in the metal trade, take a metal paper. It will save you more than its cost. If you are a manufacturer take the journal that advocates your interests. Don't patronise Free Trade journals, but help those who help you.

With Free Trade the manufacturers of this country would be ruined! English gold is scattered with a liberal hand to further Free Trade. Expend some of yours to favor Protection.

If you advertise, which is the best medium? Circulation being equal, which would you patronize—a Free Trade journal or a Protection journal? Circulation is considered the value of an advertising medium. Much depends on the character of the circulation. The New York Weekly TRIBUNE claims 200,000 circulation, and gets from two to five dollars per line for advertising. The IRON WORLD reaches more people engaged in the metal business than the New York TRIBUNE. Our rates are about ten cents per line. Which will pay the best?

Sample copies mailed free. Address
IRON WORLD PUBLISHING CO.,
dec13 No. 71 Grant street, Pittsburgh, Pa.

FILE-COVERS. FILE-COVERS. For preserving the numbers of the ENGINEERING AND MINING JOURNAL. Price $1 50. For sale by
WESTERN & CO., 37 Park Row, New York.

American Journal of Science and Arts,

Founded by Professor SILLIMAN in 1818, and now numbering 100 volumes, in two Series of 50 volumes each.

Editors and Proprietors: Professors SILLIMAN and DANA. *Associate Editors:* Professors GRAY and GIBBS of Cambridge, and NEWTON, JOHNSON, BRUSH and VERRILL of Yale.

Devoted to Chemistry, Physics, Geology, Mineralogy, Natural History, Astronomy, Meteorology, etc.

A THIRD SERIES in MONTHLY numbers, making two volumes a year of about 450 pages each, from January, 1871. Subscription price $6 00 a year, or 50 cents a number.

A few complete sets on sale of the first and second series.

Address SILLIMAN & DANA,
dec6-2t New Haven, Conn.

UPHAM'S DEPILATORY POWDER.—Removes superfluous hair in *five minutes*, without injury to the skin. Sent by mail for $1 25.

UPHAM'S ASTHMA CURE

Relieves most violent paroxysms in *five minutes* and effects a speedy cure. Price $2 by mail.

THE JAPANESE HAIR STAIN.

Colors the whiskers and hair a beautiful BLACK OR BROWN. It consists of *only one preparation*. 75 cents by mail. Address S. C. UPHAM, No. 721 Jayne Street, Philadelphia, Pa. Circulars sent free. Sold by all Druggists.
dec-6-2t

MICROSCOPES FOR SCIENTIFIC INVESTIGATIONS and Educational Purposes. Price list sent free. T. H. McALLISTER, Optician,
Dec21-6m 49 Nassau street, N. Y.

DEPARTMENT OF PUBLIC WORKS, 237 BROADWAY.

TO CONTRACTORS.

Proposals, enclosed in a sealed envelope, WITH THE TITLE OF THE WORK and the name of the bidder indorsed thereon, (ALSO THE NUMBER OF THE WORK AS IN THE ADVERTISEMENT,) will be received at this office until MONDAY, December 12, at 11 o'clock A. M., for the following works:

1. For paving Thirty-first street, between Second avenue and East River, with Belgian pavement.
2. For paving Fifty-ninth street, between Tenth avenue and Hudson River, with Belgian pavement.
3. For paving Forty-fifth street, between Fourth and Madison avenues, with Belgian pavement.
4. For paving Vandam street, between Macdougal and Greenwich streets, with Belgian pavemont.
5. For paving Eighty-sixth street, between Third avenue and East River, with Belgian pavement.
6. For paving Thirty-ninth street, between Madison and Fifth avenues, with Belgian pavement.
7. For paving Twenty-fourth street, between Sixth and Tenth avenues, with Belgian pavement.
8. For paving Thirty-fourth street, between Sixth and Tenth avenues, with Belgian pavement.
9. For paving Forty-third street, between Madison and Fifth avenues, with Nicolson pavement.
10. For paving Forty-fourth street, between Madison and Fifth avenues, with Nicolson pavement.
11. For sewer in First avenue, between Sixty-ninth and Seventy-fourth streets, with branches, and in Second avenue, between Sixty-eighth and Seventy-first streets.
12. For sewer in Eighth-eighth street, between Second and Third avenues; in Ninety-first street, between Second and Fourth avenues, with branches.
13. For regulating, grading, curb, gutter and flagging 104th street, between Fifth avenue and East River.
14. For regulating, grading, curb, gutter and flagging Sixty-third street, between First avenue and East River.
15. For regulating, grading, curb gutter and flagging Forty-sixth street, between Eleventh avenue and Hudson River.
16. For regulating, grading, curb, gutter and flagging Madison avenue (Sec. 2), between Ninety-ninth and 105th street.
17. For regulating, grading, curb, gutter and flagging Eighth avenue (Sec. 3) between 100th and 122d streets.
18. For curb, gutter and flagging Fifty-sixth street, between Seventh avenue and Broadway.

Blank forms of proposals, the specifications and agreements, the proper envelopes in which to enclose the bids, and any further information desired, can be had on application to the Contract Clerk at this office.

WILLIAM M. TWEED,
Commissioner of Public Works.
NEW YORK, November 30, 1870. dec6:2t

CORPORATION NOTICE.—PUBLIC NOTICE IS hereby given to the owner of owners, occupant or occupants of all houses and lots, improved or unimproved lands, affected thereby, that the following assessments have been completed and are lodged in the office of the Board of Assessors for examination by all persons interested, viz.:

First.—For laying Belgian pavement in Fifty-first street, from Eighth avenue to the Hudson River.

Second.—For laying Belgian pavement in Forty-sixth street, from Madison to Fifth avenue.

Third.—For laying Belgian pavement in Forty-seventh street, from Madison to Fifth avenue.

Fourth.—For laying Belgian pavement in Sixty-first street, from Third to Sixth avenue.

Fifth.—For laying Nicholson pavement in Fifty-eighth street, from Third to Lexington avenue.

Sixth.—For laying Nicholson pavement in Forty-fifth street, from Fifth to Madison avenue.

Seventh.—For setting curb and gutter, and flagging Fifth avenue, from Eighty-sixth to Ninetieth street.

Eighth.—For setting curb and gutter, and flagging and regulating and grading Avenue C, from Seventeenth to Eighteenth street.

The limits embraced by such assessment include all the several houses and lots of ground, vacant lots, pieces and parcels of land, situated on

First.—Both sides of Fifty-first street, from Eighth avenue to the Hudson river, to the extent of half the block on the intersecting streets.

Second.—Both sides of Forty-sixth street, from Broadway to Ninth avenue, to the extent of half the block on the intersecting street.

Third.—Both sides of Forty-seventh street, from Madison to Fifth avenue, to the extent of half the block on the intersecting streets.

Fourth.—Both sides of Sixty-first street, from Third to Fifth avenue, to the extent of half the block on the intersecting streets.

Fifth.—Both sides of Fifty-eighth street, from Third to Lexington avenue, to the extent of half the block on the intersecting streets.

Sixth.—Both sides of Forty-fifth street, from Fifth to Madison avenue, to the extent of half the block on the intersecting streets.

Seventh.—Both sides of Fifth avenue, from Eighty-sixth to Ninetieth street.

Eighth.—The easterly side of Avenue C, from Seventeenth to Eighteenth street.

All persons whose interests are affected by the above-named assessments and who are opposed to the same, or either of them, are requested to present their objections, in writing, to Richard Tweed, Chairman of the Board of Assessors, at their office, No. 19 Chatham street, within thirty days from the date of this notice.

RICHARD TWEED,
THOMAS B. ASTEN,
MYERS MYERS,
FRANCIS A. SANDS,
Board of Assessors.
Office Board of Assessors, New York, November Dec. 6.2t.

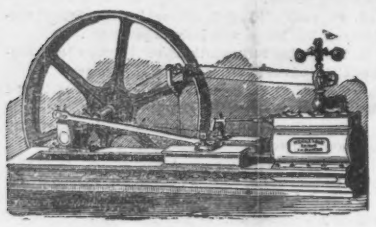
Four First Premiums of the American Institute Fair, 1870.

EMPIRE MULAY SAW HANGINGS.—The best in use. Either Straight or Oscillating. Manufactured by SNYDER BROTHERS, Williamsport, Pennsylvania.

Advertisements.

Advertisements admitted on this page at the rate of 40 cents per line. Engravings may head advertisements at the same rate per line, by measurement, as the letter press.

MACHINISTS' SUPPLIES.



TODD & RAFFERTY,

GENERAL

MACHINERY MERCHANTS, ENGINEERS, AND MACHINISTS,

Manufacturers of Stationary and Portable Steam Engines and Boilers; also Flax, Hemp, Tow, Oakum, and

ROPE MACHINERY,

MILL GEARING,

SHAFTING.

Lathes, Planers, Drills, Chucks, etc. Iron and Brass Castings. Judson & Snow's Patent Governors constantly on hand.

OFFICE AND WAREROOMS, NO. 10 BARCLAY STREET, N. Y.

Office and Works, Paterson, New Jersey.

JOSEPH C. TODD. oct-27-tf. PHILIP RAFFERTY.

NEW YORK BELTING AND PACKING COMPANY. The oldest and largest manufacturers the United States of

Vulcanized Rubber Fabrics,

Adapted to Mechanical Purposes,

invite the attention of all who are interested in the sale or use of such articles to the high standard quality and low prices of their various manufactures, comprising

Machine Belting, Steam Packing, Leading Hose, Suction Hose, Car Springs, Wagon Springs, Billiard Cushions, Grain Drill Tubes,

etc., etc., etc.,

"TEST" HOSE

made expressly for the use of Steam Fire Engines, and will stand a pressure of 400 pounds per square inch. Officers of Fire Departments requiring new hose, will find this much superior in strength and quality to any other.

PATENT SOLID EMERY VULCANITE WHEELS, a composition of rubber and emery, making a very hard uniform substance of the nature of stone throughout. These wheels for grinding and polishing metals, "gumming" saws, etc., are the most economical and effective tools that can be used.

WAREHOUSE, 37 AND 38 PARK ROW, NEW YORK.

JOHN H. CHEEVER, Treasurer.

☞Price lists and further information may be obtained by mail or otherwise on application.

oct30-1y-os

E. LYON,

MANUFACTURER OF

Patent Portable Hydraulic Jacks and Punches.

NO. 470 GRAND STREET, NEW YORK

For Raising Heavy Weights, such as Locomotives Boilers, Guns, Heavy Machinery, Wrecking Purposes, putting together Water and Gas Pipes, pushing off Cranks and Propellers, Pulling, Proving Chains and Ropes, setting up Rigging, or Pulling Stumps, Punching and Shearing Iron, Die-Sinking, etc.

☞IMPROVED PATENT HYDRAULIC JACKS, that run out their entire length in a HORIZONTAL or any other position.

PATENT HYDRAULIC PUNCH,

For Punching Iron, Die-Sinking, etc. Ap 12;1y

COOPER'S GLUE AND REFINED GELATINE.

COOPER HEWITT, & CO.,

NO. 17 BURLING SLIP, NEW YORK.

Bar Iron, Braziers' Rods, Wire Rods, Rivet and Machinery Iron, Iron and Steel Wire of all Kinds, Copperas,

&c., &c.

RAILROAD IRON, COOPER WROUGHT IRON BEAMS AND GIRDERS,

Semi and Cast-Steel, Gun-Barrel and Component Iron,

PUDDLED AND REFINED CHARCOAL BLOOMS,

Ringwood Anthracite and Charcoal Pig Iron.

Works at Trenton and Ringwood, N. J.

May 17:1y

B. KREISCHER & SON,

New York Fire Brick

AND

STATEN ISLAND

Clay Retort Works.

Established 1845.

B.K FIRE BRICK

Office, 58 Goerck Street, Corner Delancy Street, East River, New York. mar28-1y-q

---

LADIES DESIRING TO PROCURE A first-class Sewing Machine against easy monthly instalments or work, may apply to 294 Bowery, New York. Sept. 20-6m

---

THE GUTTA-PERCHA AND RUBBER MANUFACTURING CO.,

LATE BENEDICT, TORRY & TWOMBLY, AGENTS,

9 and 11 Park Place, - - - - - - - - - - - NEW YORK

MANUFACTURERS OF VULCANIZED RUBBER FABRICS, ADAPTED TO MECHANICAL AND MINING PURPOSES,

Rubber Belting, Packing and Hose,

"Patent Combination" Steam Fire Engine Hose.

The only Hose that will stand the great pressure and severe tests of Steam Fire Engines without bursting or sweating. Adopted EXCLUSIVELY by the Metropolitan Fire Department of New York, the United States Navy, and recommended to all Fire Departments for adoption throughout the Country by the New York Board of Fire Underwriters. This Hose is CHEMICALLY PREPARED, so as to prevent MILDEW, DRY AND WET ROT, AND ALSO THE DETERIORATION OF THE RUBBER, under Letters Patent, No. 99,935, and other valuable patents.

ALSO SUCTION HOSE, VALVES, GASKETS, STEAM and PETROLEUM OIL HOSE, GUTTA-PERCHA FACTORY BUCKETS,

BEST OAK-TANNED LEATHER BELTING, PAGE'S PATENT LACE LEATHER, &c., &c.

MANUFACTORY, 530 West 25th Street; SALESROOM, 9 and 11 Park Place, near Broadway, NEW YORK.

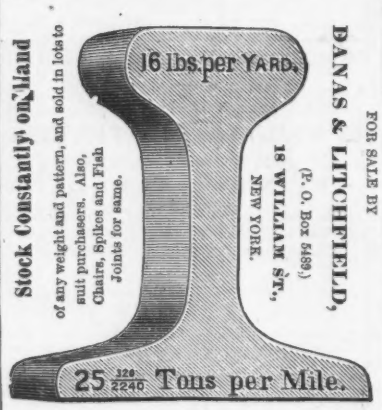
☞ Price Lists and further information may be obtained by mail or otherwise on application.

WILLIAM A. TORREY, Manager.

P. O. Box 485. May 30:6m A. C. BENEDICT, Jr., Treasurer.

ENGINEERS' SUPPLIES.

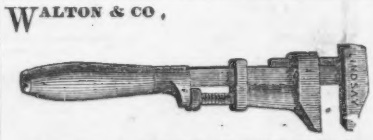
RAILROAD IRON FOR MINES.


Stock Constantly on Hand
of any weight and pattern, and sold in lots to suit purchasers. Also, Chairs, Spikes and Fish Joints for same.
16 lbs. per YARD.
25 320/2240 Tons per Mile.
BANAS & LITCHFIELD,
(P. O. Box 5489.)
18 WILLIAM ST., NEW YORK.
FOR SALE BY

Light Locomotives, for use in Collieries, Mines, etc. mch13-6m

---

WALTON & CO.,



(Successors to LINDSAY, WALTON & CO.,)

Manufacturers and Importers of

RAILWAY AND MACHINISTS SUPPLIES,

LINDSAY'S Patent Screw Wrench.
WEBSTER'S Patent Screw Wrench, with Pipe, Holder and Cutter combined.
WALTON'S Patent Tube Sheet Cutter.
WALTON'S Patent Conductor's Punch.

WAREROOMS:

56 John Street, New York.

JOSEPH J. WALTON, JAMES H. LYLES,
HENRY R. ROGERS. sept26-3m

STEAM ENGINES

FROM 4 TO 500 HORSE-POWER,

Including CORLISS PATENT CUT-OFF ENGINES, SLIDE VALVE STATIONERY ENGINES, and PORTABLE ENGINES. Also, IMPROVED CIRCULAR SAW MILLS, etc.

Send for Descriptive Circular and Price List.

WOOD & MANN STEAM ENGINE CO.,

UTICA N. Y.

Warerooms, 42 Courtland Street, New York; and 201 and 203 South Water Street, Chicago, Ill. nov-7-1y-os

---

ALBERT BRIDGES,

MANUFACTURER AND DEALER IN

Railway and Mining Supplies and Machinery.

Ball's Patent Telescope Jack.

NO. 46 CORTLANDT STREET,

P. O. Box, 2843, NEW YORK.

Aug 31-1y

ENGINEERS' SUPPLIES.

THE BEST TURBINE WHEEL.

SWAIN'S

Gave **5 Per Cent.** better results at the **Lowell Test** than any of its **Highly Polished Competitors.**

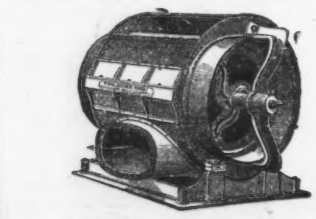
It will give from 30 to 100 per cent. more power, in proportion to its size, than any other wheel.

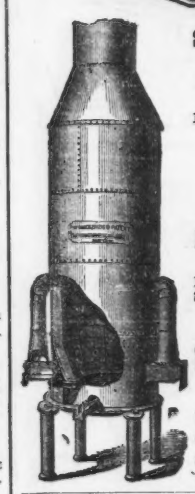
Guaranteed to give from 10 to 50 per cent. more power, with the same water, than any other wheel in the market. It is the best made, most compact, runs longer without repairs, and gives better satisfaction than any other wheel.

☞ Send for report of tests, with description and diagrams.

SWAIN TURBINE CO.,

Dec 6:6m **North Chelmsford, Mass.**





SMITH & SAYRE

MANUFACTURING CO.,

PROPRIETORS AND

MANUFACTURERS

OF THE

Mackensie Paten

BLOWER and CUPOLA and SMELTING FURNACE.

Also, Mackensie's Patent GAS EXHAUSTER and COMPENSATOR. Address

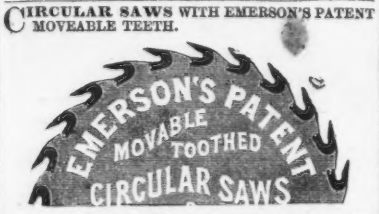
SMITH & SAYRE

MANUFACTURING COMPANY,

95 Liberty street, N. Y. Send for illustrated phamphlet.

Mar26-1y

CIRCULAR SAWS WITH EMERSON'S PATENT MOVEABLE TEETH.



These Saws are meeting with unprecedented success, and their great superiority over every other kind, both as to efficiency and economy, is now fully established

Also,

EMERSON'S PATENT PERFORATED CIRCULAR AND LONG SAWS,

(All Gumming avoided,) and

EMERSON'S PATENT ADJUSTABLE SWAGE,

for Spreading, Sharpening, and Shaping the teeth of all Saws. Price, $5. Manufactured by the

AMERICAN SAW COMPANY

Office No. 1 Ferry St., corner Gold St., New York.

Factory, Trenton, N. J. Branch Omce for Pacific Coast, No. 606 Front St., San Francisco, Cal.

Send for new Descriptive Famphlet and Price List.

july1-1y

MERRICK & SONS'

Southwark Foundry,

NO. 430 WASHINGTON AVENUE, PHILADELPHIA.

William Wright's Patent Variable Cut-Off Steam Engine, regulated by the Governor. Merrick's Safety Hoisting Machine, Patented June, 1868. David Joy's Patent Valveless Steam Hammer. D. M. Weston's Patent Self-Centering, Self-Balancing Centrifugal Sugar Draining Machine, and Hydro Extractor for Cotton and Woolen Manufacturers, ju28tf

---

MISCELLANEOUS.

MOUNT SAVAGE FIRE BRICK

GOVERNMENT STANDARD.

Manufactured by the

Mount Savage Fire Brick and Mining Company.

This Company having acquired the Fire Clay properties and Brick Works of the

Consolidation Coal Company,

will receive orders for their unequalled FIRE BRICK for Blast, Puddling, Smelting and Glass furnaces. Diagrams of shapes and prices will be furnished on application to

J. S. MACKIE, Pres., 90 Broadway, New York.

JAMES A. MILLHOLLAND, Vice Pres.,

Dec. 7.tf Mount Savage, Maryland.

Fishkill Landing Machine Works,

Established 1853.

FISHKILL-ON-THE-HUDSON, N. Y.

STEAM ENGINES,

Iron and Brass Castings, Forgings, Boilers, and Machinery.

Sole Manufacturers of the celebrated LOOMIS STEAM ENGINE, with Patent Variable Cut-off by the Governor.

Jobbing and Repairs promptly attended to.

JAS. L. TELLER, Secretary. MILO SAGE, President.

sept13:1y

HORTON, MABIE & CO.

PEEKSKILL, N.Y. & PERTH AMBOY, N.J.

Fire Brick Works.

MANUFACTURERS OF ALL SHAPES OF

NO. 1 FIRE BRICK,

For Furnaces, Rolling Mills, Forges, Steel-Works, Lime Kilns, Cupola Furnaces.

BLOCKS AND TILES,

For Blast Furnaces, Gas-Works, Malleable Iron-Works, Bakers' Ovens, Green-Houses, etc. Stove-Heater, and Range Linings, Cylinders, etc., of every description, to order.

FIRE-CLAY, KAOLIN, FIRE-SAND, FIRE-CEMENT,

nov1-1y IN BULK OR BARREL

THE COLD ROLLED SHAFTING.

This Shafting is in every particular superior to any Turned Shafting ever made, and is the Most Economical Shafting to buy, being so very much stronger than Turned Shafting, less diameter, answers every purpose, causing a great saving in couplings, pulleys, and hangers. It is perfectly round and made to Whitworth's guage. All who give it a trial continue to use it exclusively.

An assortment of this superior Shafting on hand and for sale by

GEORGE PLACE & CO., AGENTS,

126 and 128 CHAMBERS STREET, NEW YORK.

sept13:3m

E. T. MILLIKEN & CO.,

139 MAIDEN LANE, NEW YORK, and

21 NORTH MARKET STREET, BOSTON,

Manufacturers of

Superior Mining Machinery Oils;

Also, Manufacturers and Dealers in

SPERM, WHALE, ELEPHANT, LARD AND SEAL OILS;

Dealers in

TANNERS', CURRIERS', NEAT AND WOOL OILS.

All goods guaranteed as represented. nov. 1

E. Allen & Co's NEW MODEL Cartridge Revolver.

Weight only 6 oz. Can be carried in the vest pocket. Seven Shots, 22-100 calibre. Lightest and best Revolver in the world.

Address, ETHAN ALLEN & CO.

WORCESTER, Mass.

Nov. 22 6m

THOMSON'S PATENT ROAD STEAMERS.—The undersigned, Sole Manufacturer under Thomson's American Patents, is now prepared to take orders for these remarkable Traction Engines. Mine owners and others, interested in the transportation of heavy loads over Common Roads, are invited to inspect a Steamer and Train now in operation near New York. For full particulars apply to D. D. WILLIAMSON, 32 Broadway, or Box 1809 P. O. 4t-os

---

METALLIC PATTERN MOLDING LETTERS FOR PATTERN MAKERS TO PUT ON PATTERNS FOR CASTINGS &c. H.W. KNIGHT, SENECA FALLS, N.Y.

sept13:3m-os

LAFLIN & RAND POWDER CO., 170 BROADWAY, NEW YORK, invite attention to their facilities for delivering

BLASTING POWDER,

SAFETY FUSE,

ELECTRICAL BLASTING APPARATUS, &c.,

wherever required, from having nine manufactories in different States, beside agencies and magazines at all distributing points. nov. 1:1y

---

PARKER'S PATENT SHINGLE MACHINES.—One man can saw and joint 20,000 in ten hours on this machine.

Manufactured by SNYDER BROTHERS,

1t Williamsport, Pennsylvania,